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The Electrical Industry.

AS was briefly mentioned in our last issue, a "Monograph on the Electrical Industry" has been prepared by the B.E.A.M.A. for the information of Committee "B" of the World Economic Conference Preparatory Committee. In a foreword Mr. D. N. Dunlop intimates that a study of international developments in the electrical industry, both technical and economic, would possess great importance—if it could be carried out with accuracy—at the present time "when the whole industry is in a state of flux, preparatory to embarking on a period of rapid expansion." In this Monograph, therefore, the B.E.A.M.A. has prepared a partial survey assembling all available relevant data, and it has carried out an international census bearing on the production of electrical goods, the world market, actual and potential, for such products, and the distribution of production costs and prices.

The estimates differ materially, at times, from those made in the German Monograph submitted to the same Committee by the Zentralverband der Deutschen Elektrotechnischen Industrie, and it is felt, therefore, that the British survey and the German document should be read in conjunction. It is pointed out that in the expression of general principles there is fairly close agreement between the two surveys, but there is natural confusion in comparing foreign trade statistics where the official interpretations of classifications of trade returns vary.

The document reviews the developments that have taken place in organisation and technique of the electrical industry in different countries. Beyond certain lamp production arrangements, international agreement on a large scale does not exist in the electrical industry; though the leading American and German firms have come into contact again for

exchange of research data and manufacturing experience, "no international control either over production or price has yet been attempted." This statement reached us just as reports were appearing in the newspaper Press to the effect that a big combine of German and American electrical concerns was under discussion. The various sections of the B.E.A.M.A. Monograph contain much statistical and other information respecting the world production of electrical goods, the development of electrical export trade, and the consumption of electrical goods in different countries in 1925 per head of population. There is a section on the world market for electrical goods, in which the production of electricity in various countries is tabulated and comments are made upon the place and measure of development of electrical power in industry and transport. The statistics foretell a prospect of great expansion of the electrical industry due to the uses of electrical power in these directions; notes on the distribution of production costs, and on the significance of prices, form the closing sections.

The valuable information here brought together hardly lends itself to brief review. The whole document requires to be read with care by all who are deeply concerned with questions of vital interest to the industry if they aspire to be up to date in their knowledge of affairs, tendencies, and prospects.

The Last Month of the Campaign.

As we have just entered the month of March, we take the liberty of reminding our readers that the E.D.A.-E.L.M.A. Better Home Lighting Campaign is nearing its end so far as the actual competition is concerned. The Perforated Ballot Sheet has to be removed from the booklet 1002 and posted to the E.D.A. offices, 15, Savoy Street, Strand, London, W.C.2, on or before March 31st. It is not yet time to attempt a review of the great work that has been and is being accomplished, though the temptation is strong upon us to say congratulatory things regarding those who have really seriously co-operated. We prefer to direct everybody's attention to the much that remains to be done and to the great opportunity that presents itself of making this last month the best of all. Weekly progress reports to which we have given publicity tell a story of the many thousands who have been interested in the electrification of the home during the past five months through the various electric houses that have been co-operatively prepared for their inspection. Though the story is necessarily incomplete, anybody can see that a wonderful propaganda work for the industry has been done, and that its good effect will never end. Yet we are wondering how the map on page 10 of the E.D.A. publication 1000 will look when we have been enabled to fill it in with colour varying from brilliant red to the palest nondescript hue indicating the campaign temperature of the different areas. There is time in the next three or four weeks to change the story that will be told by such a map if it be published.

Dr. S. Z. de Ferranti, F.R.S.

It was with great pleasure that we learnt that the President and Council of the Royal Society at their recent meeting decided to recommend for election into the Society Dr. S. Z. de Ferranti. Of all the distinctions that the world of science has to offer, there is none more coveted, more jealously guarded, or more difficult to acquire, than the Fellowship of the Royal Society of Great Britain, which excels all academic degrees in dignity and status, and is in itself a guarantee that, in the proud formula of the Legion of Honour, the man who bears it has deserved well of his country. It is awarded not on the strength of any written or oral examination, but on the sterner and more searching test of public opinion as moulded by assured knowledge of achievement of the highest order—sometimes a single epoch-making discovery, sometimes the fruit of the work of a lifetime.

It is under the latter category that Dr. Ferranti may perhaps be classified. Like Edison, whose eightieth birthday we recorded a few weeks ago, he entered the electricity supply industry at a time when it was a conception rather than a reality; in those days the great pioneers invented new devices as the need arose, and thought nothing of the feat—but whereas Edison adopted the direct-current system, Ferranti followed the a.c. path, taught the world to transmit electricity at high pressure from outside a city to transformers connected in parallel, and thus laid the foundations of the great business of a.c. generation, transmission, and distribution which is transforming the conditions of human existence throughout the world. Ferranti, with dauntless courage and inexhaustible resource, designed his own generators of unprecedented dimensions, his own cables for unheard-of pressures, his own transformers and switchgear—and inspired in his colleagues and pupils a personal devotion which to-day bears witness to the charm of manner and the sterling worth of a great leader.

Had the nation followed Ferranti it would have led the world in electrical engineering. The least we can do is to recognise that he indicated clearly the right way to go, and that the Electricity Act of 1926 is a belated attempt to regain that path and carry out the policy that he initiated. We are sure, therefore, that all electrical engineers will join us in congratulating him on his Fellowship, and in the hope that the example set by Science will be followed by the State.

Ultra-Violet Rays.

We notice that, in accordance with professional advice, the London County Council's Control Committee has refused to sanction the use of ultra-violet rays at a massage establishment without medical supervision, on the ground that the treatment has potential dangers. The medical profession possesses one of the strongest of all trade unions, the only stronger one, perhaps, being the law, and we feel no surprise at the action which has been taken in this matter. Where the danger is real and inherent, as in the case of X-rays, we entirely agree with the view that the amateur should be warned off the ground, for his own sake and that of his family, but ultra-violet radiation is on a different footing.

The fact is that medical men for some time past have been preaching the merits of ultra-violet rays, whether natural or artificial; if the former cannot be obtained, the latter afford the only alternative, and a brisk demand is springing up for the means of producing them, which is in course of being met by numerous manufacturers. That the medical profession should seek to retain control of this valuable curative agency is perfectly natural; but it is not likely to be successful in that aim. Just as, for instance, aspirin has passed from professional hands into general use, so will ultra-violet radiation become a household commonplace. It is not without significance that it is to be found in the Ideal Home Exhibition which was opened on Tuesday.

However, it is only in houses equipped for electric lighting that this will be possible, and as not more than one home in five is so equipped, the field is limited. The successful practice of electrical treatment will arouse the interest of the residents in gas-lighted houses, who must perforce go to their medical attendants if they wish to obtain such treatment for themselves—and thus the movement, which is gathering way, will benefit the medical profession in the long run, besides benefiting the user.

Agricultural Electrical Machinery.

A comparative review of the exhibits at the 1927 Paris Agricultural Exhibition with those of previous years, and machines employed in other countries, depicting some items of special interest to engineers at home.

By R. BORLASE MATTHEWS, Wh.Ex., A.M.Inst.C.E., M.I.E.E., F.R.Ae.S.

NEARLY 1,000 electric motors were either shown or utilised for driving the machines on view at the above exhibition. This is indicative of the rapidly growing appreciation of the electric-motor drive in connection with agricultural work on the Continent. Of course, the oil engine has not yet been entirely displaced, as there are still regions where public electricity supply is not available, and quite a number of such engines were exhibited; but naturally they were not employed to demonstrate the driving of machinery when a more up-to-date method was available. Incidentally, it may be remarked that there is a distinct trend in the design of small petrol and paraffin oil engines towards a very neat and clean external appearance. Amongst the neater type of engine was one of British make—the Lister. Where such engines were employed for driving dynamos, direct coupling was adopted almost without exception.

Fig. 1.—Law ¼-h.p. Portable Motor.

A feature of the exhibition was a special display of portable electric agricultural motors shown driving various forms of farm machines. This special exhibit was arranged by the Union des Syndicats de l'Electricité. Some detailed notes concerning this exhibit will be given a little later on.

This was the sixth French exhibition devoted entirely to agricultural machinery without the inclusion of any livestock whatsoever. In England the general feature of agricultural shows is the livestock, while the machinery exhibits seem to be a sort of "Cinderella," only admitted by the authorities because they can ill afford to dispense with the income that is provided by the rents of the spaces occupied. At the Paris exhibition there were 623 exhibitors, a 25-per cent. increase over the figure of last year. The stands taken occupied 50,000 square yards. There were no German exhibitors, but it is proposed to admit them next year. British manufacturers were well represented, and included Ruston & Hornsby; Ransomes, Sims and Jefferies; Clayton; Austin & Fordson Tractors; Bamfords, Ltd.; Harrison McGregor; Listers; Tudor Batteries, and others.

A very noteworthy feature of the exhibition was the strict classification of all the exhibits. This is very valuable from the purchaser's point of view, as it enables him to make direct comparisons; also from the maker's aspect, as it ensures that his exhibit will not be overlooked, as might be the case where exhibits are arranged by the makers instead of being classified with

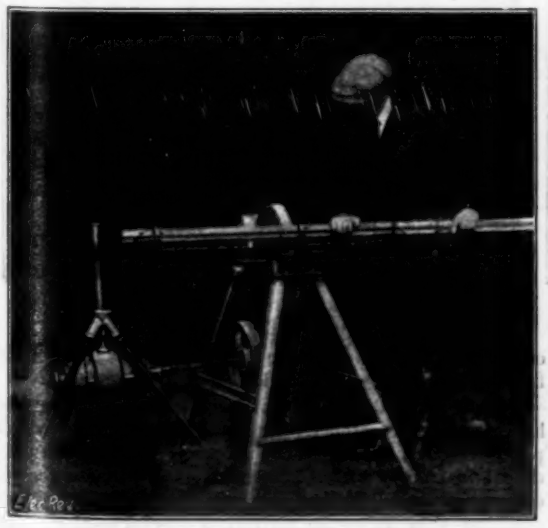

Fig. 2.—Law Motor Driving Grindstone.

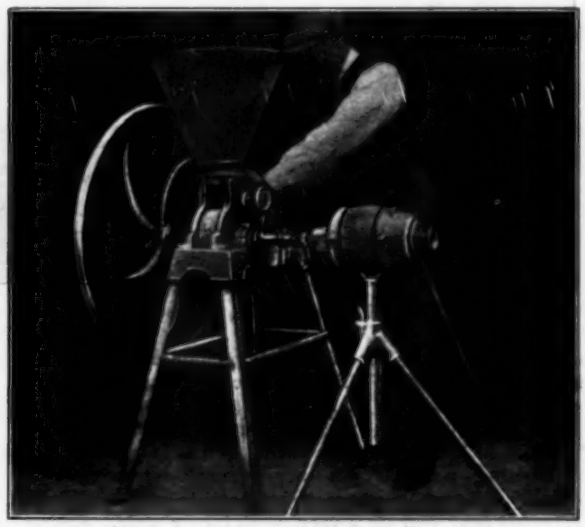

Fig. 3.—Law Motor Coupled to Oats Crusher.

the whole of the entries. The arrangement is the outcome of the experience of the general manager, Mr. Villard, who has made a point of visiting all the important British and Continental agricultural shows for the past 25 years.

Apart from the agricultural electric motor exhibit, the most interesting feature of the show was the huge combined reaping and threshing machines shown in operation by several American manufacturers; they were driven by electric motors, though in many

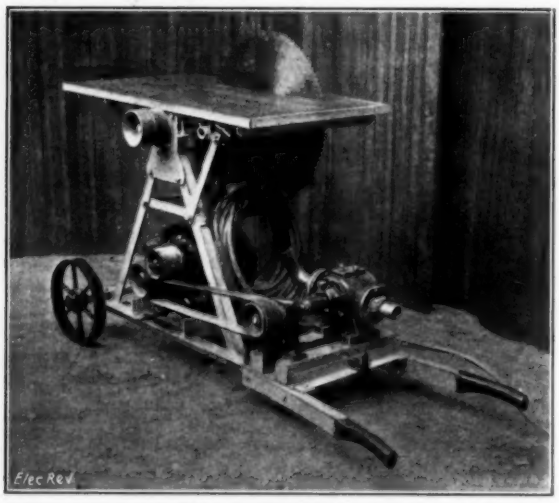

Fig. 4.— A "Fleno" Motor Outfit for driving a Saw and a Pump.

cases they would undoubtedly be operated by oil engines. These big machines are intended more particularly for use in the North of Africa and in parts of America where the grain is ripe and dry when cut, and also where straw is of little value and is discarded with the chaff on the field, to be ploughed in later on. The width of cut of such a machine is up to 15 ft., and it has a capacity of 25-30 acres per day while threshing out 125-150 quintals (440-530 bushels) of wheat. These machines are constructed entirely of metal, including the threshing portion.

tion. In addition to the public display at the exhibition, tests were carried out to demonstrate the portability of each complete motor-driven unit. The next stage will be the technical trials of the Paris Laboratoire Centrale d'Electricité, where the usual efficiency, temperature-rise, insulation, and other records will be made. Upon completion of this part of the work, the motors will be taken to an agricultural college, and on the farm they will be again tested under working conditions. The main points to which the judges will give consideration are: (1) The speed with which the equipment can be put into operation; (2) the brake h.p. available on the shaft of the driven machine; (3) safety in use for the farm labourers and the machines to be driven; (4) facility for transport; (5) facility for the substitution of the motor; (6) robustness; and (7) price. The motors are specified to be of the single- or 3-phase type in three sizes, which French experience has indicated as being most suitable for farm purposes, viz., 1.5, 3, and 5 h.p. The output is measured at the motor shaft as the basis of a one-hour rating. The competition is limited to French manufacturers, and the motors have to conform to the French National Standardisation Regulations. They are required to be delivered complete, ready for use, together with a standard length of flexible cable. The standard speed specified was 1,500 r.p.m. when running on no load, but speeds of 3,000 and 750 r.p.m. were permitted as alternatives. It was further specified that through reduction gears, speeds of 1,500, 300, 150, and 50 r.p.m. (with a tolerance of 10 per cent. less) were to be available on the shafts of the machines to be driven. The direction of rotation of the latter machines was specified to be clockwise.

The judges selected were representative of the Government departments concerned, the electrical industry, the rural electrification authorities, the agricultural machine builders, and agricultural bodies. The above particulars have been given in detail, as this is probably the first case of national competitive tests for agricultural electric motors.

Twelve manufacturers sent in about eighteen entries, the most novel of which was a motor of the Electromoteur Co., which had a similar appearance to a lathe headstock without back gearing, the armature being, of

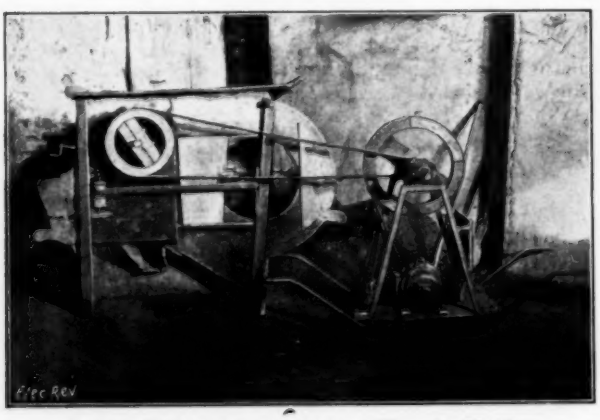

Fig. 5.—"Touchard" Gearing driving a Winnowing Machine.

Fig. 6.—"Touchard" Gearing bracketed for Root-cutter Drive.

A novelty was a Fordson tractor, mounted on wheeled stilts. The object of this is to allow for the cultivation of high crops set out in line, such as sugar-cane, cotton and grape vines; the clearance under the body of the machine is nearly 4ft.

Turning now to the agricultural electric-motor display, it may be mentioned that this section will be repeated next year on a very much larger scale. Owing to limited time, only 12 manufacturers sent in entries. The object of the tests that are to be carried out is rather of a standardising nature than competitive, as no awards are to be made; it is to reassure the farmer that he can safely purchase any electric agricultural motor that has passed the tests of the Associa-

course, stationary, while the field, which was formed like five stepped pulleys, rotated.

The Société d'Electro-Motoculture de Carcassonne has always advocated the use of a single motor for all purposes on the farm. The motor it supplies is cylindrical in shape, without feet, but it is fitted with two convenient handles, and on to the frame of every machine that is to be driven, a special semi-circular bed is fitted to take the motor. In addition to the ingenious friction drive which this firm showed last year (Electrical Review, April 9th, 1926, p. 569), it has now introduced a special intermediary speed-reduction gear for use after the preliminary friction-drive speed reduction. This consists of two gear wheels,

the smaller of which is connected directly to a V-groove pulley; the machine itself is then driven off this pulley by means of a leather link belt. The writer has made some independent tests of this friction drive and found that the slip is excessive on large ratios of speed reduction; evidently the makers have come to the same conclusion—hence their adoption of this intermediate speed-reduction gear.

The "Law" portable ½-h.p. motor, which is mounted on a tubular tripod stand, fig. 1, is arranged for direct connection to barn machinery. A double reduction gear is incorporated within the motor frame. The motor starter and speed controller is incorporated in the end frame of the machine, and consists of a simple circular handle, which has merely to be turned to put the motor in operation, to change the speed and to reverse it. The tripod stand is of fixed rigid construction, but it is provided with a central vertical adjustable tubular support for the motor, so that the latter can be aligned to the machine to be driven. During last year 1,680 of these special agricultural-type motors were sold. Figs. 2, 3, and 4 show some applications for agricultural motors, and figs. 5 and 6 show the "Touchard" portable reduction gearing, which can be used with any standard motor.

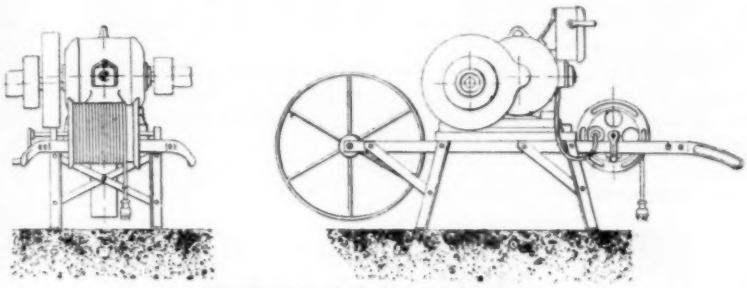

Fig. 7.—The "Patay" Reduction-geared Motor.

The "Patay" portable farm motor, fig. 7, was shown provided with a toothed reduction gear. The single-barrow wheel is so arranged as to be well clear of the ground when the motor is in use. The general design of the chassis of this set is typical of those of many French makes. Belt drive, with jockey pulleys, is the usual speed-reduction device.

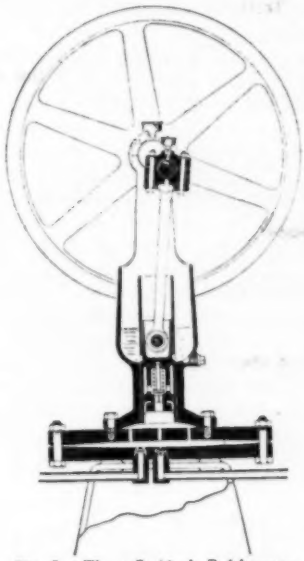

Fig. 8.—The "Corblin" Refrigerator.

Among the refrigerating machines was the "Corblin" diaphragm type, fig. 8. Several minor improvements have been made since last year. It is obvious that the use of a diaphragm entirely overcomes leakage of the substance (in this case ammonia), which is employed as a refrigerant. The "Corblin" machine is now made in domestic sizes.

(To be continued.)

What is it to Drive?

Some guiding suggestions for the user when choosing the motor and method of drive to be employed.

By ROBERT MARSDEN, M.M.A.E.

IT is useless to attempt to supply a motor unless you are in possession of the following information:—

1. The type and make of machine to be driven.
2. The load at starting.
3. The drive required.
4. Speed variation—if any.

If such information is not in your possession, it is always advisable to visit the prospective buyer, unless it is a question of long distance or export.

Knowing what machine is to be driven will undoubtedly smooth away most of the difficulties, but do not spoil the job by cutting the horse-power. You cannot expect the best life out of a motor which is compelled to run continually at its full output. Naturally, machine makers—out to sell their products—cut the horse-power to a minimum, leaving no safety margin. The best plan is to take the published horse-power and add about 20 per cent. to be sure of meeting all requirements. By doing this you will also allow for the "stiffness" inseparable from a new machine.

In the case of a direct-current supply, it can generally be assumed that a compound interpole motor will meet the essential requirements, as this type of motor will give a very high starting torque, and reasonable speed variation without commutation troubles, and deal with sudden changes of load in an excellent manner. Even if the starting is easy and no speed variation is required, should there be any danger of an erratic load, put in a compound interpole motor and be on the safe side.

In alternating-current work, however, a supply company has much more to say in your choice of a motor on account of starting conditions; therefore, if any doubt exists, see the company's representatives before making a decision. If no speed variation is wanted, you will do well to consider the new designs of high-torque squirrel-cage motors now on the market which, with approximately three times full-load current, will develop 200 per cent. of their running torque when starting. There is a wide field of possibilities open to this class of motor. These motors are now used for driving nearly every class of machinery which, prior

to their advent, had to have the slip-ring type. Another point in their favour is their cost, which is little more, if any, than that of the ordinary squirrel-cage type. All over the country to-day they are in use driving textile machinery, conveyors, cranes, hoists, pumps, &c., and they offer the finest driving facilities procurable.

Speed variation on an a.c. supply, with the exception of the a.c. commutator motor, is not so efficient as on a d.c. supply, but many very satisfactory equipments are in use, giving 50 per cent. variable reduction in motor speed by using resistance in the rotor of a slip-ring motor. It should be remembered that this 50 per cent. reduction corresponds to a 100 per cent. speed variation on the driven machine.

In cases where the saving of floor space has to be considered, if you cannot directly couple your motor, perhaps one of the best drives is by the jockey-pulley. By this means, an efficient drive can be obtained with even four-foot centres. There is this advantage with a belt: if it should break, it can be immediately replaced or repaired. An alternative method is by gear-driving, but unless it is very carefully designed and fitted, your motor pinion will require continual replacement. Under all circumstances, the motor base must be mechanically fastened to the frame of the machine being driven, otherwise "creeping" will take place with disastrous results. There are times, however, when, owing to structural details, it is not possible to introduce a gear. The chain drive is then clearly indicated.

Another important point for consideration is the neighbourhood and atmosphere in which the motor has to work. In chemical works, for instance, it is by far the best to have a totally enclosed machine, despite the extra cost involved, if there is any likelihood of dangerous gases attacking the insulation. When the motor has to work in the open, it is essential to specify "weatherproof," not merely "totally enclosed." Where inflammable or dangerous gases are liable to accumulate, *never take a risk*, it is much too vital a point to disregard—demand a flame-proof and explosion-proof motor.

In conclusion, it is well to remember that there exists no driving proposition which cannot be successfully accomplished electrically, provided the right motor is installed.

Sag Calculations for Power Transmission Lines.

A consideration of the requirements for Overhead Conductors under varying working conditions due to changes in temperature, wind pressure, ice covering, &c.

By WILLIAM T. TAYLOR, M.Inst.C.E., M.I.E.E.

(*Continued from page* 292.)

The values from which different charts may be plotted are given in the accompanying tables. That is to say, with reference to Table V only, we may:

(1) Plot curves for each size of conductor and for the more generally used stringing temperatures, in terms of span length and sag. In this way the values of sag for *any* span length are found.

(2) Plot curves for one size of conductor and for

TABLE II.—Sag in Plane of Resultant, corresponding to the Loading on Bare Hard-Drawn Copper (Solid) Conductors under the Electricity Commissioners' Rules.

Formula: $D = \frac{l^2 W}{8 P}$.

Length of span in feet = *l*.	*Total maximum allowable tension in conductor in lb. = P.														
	456	508	561·5	633	662	757·5	810·5	875	971·5	1,071	1,437·5	2,064·5	2,655	3,315·5	3,750	4,272·5
	*Total resultant weight per foot of conductor in lb. = W.															
	·882	·892	·902	·917	·923	·940	·951	·962	·981	·998	1·064	1·178	1·288	1·397	1·504	1·610
	†Weight per foot of bare conductor, in lb. = w.															
	·056	·0627	·0699	·0795	·0834	·0959	·104	·113	·126	·140	·193	·283	·386	·482	·578	·675
	†Sectional area of conductor in sq. inch = A.															
	·01458	·01629	·01815	·02061	·02164	·025	·02688	·02926	·03269	·03631	·05	·075	·10	·125	·15	·175
100	2·418	2·195	2·008	1·812	1·743	1·551	1·466	1·374	1·262	1·115	·995	·713	·606	·543	·501	·477
150	5·439	4·938	4·518	4 074	3·921	3·490	3·300	3·090	2·840	2·508	2·08.	1·6 5	1 364	1 222	1·128	1·073
200	9·6:0	8·:99	8·032	7 243	6·971	6·204	5 866	5·497	5·049	4·459	3·701	2 853	2·425	2·17?	2·0(5	1·907
250	15·109	13 737	12·550	11·317	10·892	9·694	9·166	8 587	7·889	6·967	5·78?	4·458	3·7??	3·394	3·133	2·980
300	21·756	19·:52	18 072	16·296	15·684	13·960	13·200	12·360	11·360	10·032	8·328	6 420	5·456	4·8·8	4·512	4·292
350	29·613	26·887	24·598	22·182	21·349	19·005	17·968	16·822	15·462	13·656	11·334	8·737	7·4 8	6·652	6·141	5·841
400	38·680	35·196	32·128	28 972	27·884	24·816	23 464	21 988	20·196	17·856	14·804	11·412	9·700	8·688	8·020	7·628
450	48·951	44·442	40·662	36·666	35·289	31·410	29·700	27·810	25·560	22·572	18·738	14·445	12·276	10·998	10·152	9·657
500	60·435	54·8?2	50·200	45·270	43·570	38·779	36·667	34·332	31·555	27·870	23·130	17·831	15·160	13·577	12 553	11·922
550	73 126	66·395	60·742	54·777	52·720	46·923	44·367	41·542	38·181	33·723	27·987	21·575	18·344	16·428	15·165	14·426
600	87·024	79·008	72·288	65·184	62·736	55·840	52·800	49·440	45·440	40·128	33·312	25·680	21 824	19 552	18·048	17·168
650	102·133	93·745	84 838	76·501	73·628	65·534	61·966	58·027	53·329	47·095	39·095	30·138	25·613	22 946	21·181	20·148
700	110·452	107·548	98·392	88·728	85 396	76·020	71·872	67·288	61·848	54·624	45·336	34·948	29·712	26·608	24 564	23·364
750	135·981	123·633	112·950	101·853	98 028	87·246	82·494	77·383	71·01	62·703	52·047	40·122	34·101	30·5 6	28·197	26·820
800	155 920	140·784	128 512	115·888	111·536	99·264	93·856	87·952	80·784	71·344	59·216	45·6?8	38·80?	34·752	32·080	30·512
850	174·061	158·829	145 078	130 825	125 912	112·062	105·958	99·371	91·197	80·539	66·851	51·534	43·801	39·284	36·217	34·448
900	195·804	177·:68	162·648	146·664	141·156	125·640	118·800	111·240	102·240	90·288	74·952	57·780	49· 04	43 992	40 608	38·628
950	218·173	198 333	181·222	163·417	157·280	139·982	132·358	124·091	113·917	100·603	83 507	64·374	54·713	49 010	45·241	42·932
1,000	241·749	219·488	200·800	181·082	174·282	155·115	146·667	137·43	126·222	111·480	92·521	71·324	60·640	54·307	50·133	47·688

*That the factor of safety shall be based on the breaking load, and shall be calculated on the assumption that the line conductors are at a temperature of 22° F. and have a covering of ice to a radial thickness of half an inch, and that they are simultaneously subjected to a wind of 50 miles per hour at right angles to the line, this wind to be taken as exerting a pressure equivalent to 8 lb. per sq. ft. calculated on the whole of the projected area of the ice-covered lines.

†British Standard Specification values.

TABLE III.—ACTUAL LENGTH OF CONDUCTOR AT DATUM TEMPERATURE WITH MAXIMUM LOADING.

Formula: $L = l + 8D^2/3l$.

A/l.	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1,000
·01453	100·156	150·525	201·25	252·44	304·21	356·57	409·98	464·20	519·47	575·92	633·67	692·80	753·50	815·72	879·70	945·68	1013·64	1063·65	1155·85
·01629	100·128	150·381	200·90	251·77	303·05	354·84	407·23	460·29	514·12	568·76	624·37	681·04	738·89	797·18	857·76	919·30	982·32	1046·76	1128·37
·01815	100·108	150·363	200 86	251·68	302 91	354·61	406·88	459·90	513·44	567·89	623·24	679·53	736 89	795·38	855·04	916·12	978·43	1042·24	1107·52
·02061	100·087	150·295	200·70	251·37	302·36	353·36	405·59	457·97	510·93	564·54	618·89	674·03	729·98	786·86	844·76	903·72	96 ·78	1024·97	1087·44
·02164	100 081	150·274	200·65	251·27	302·19	353·48	405·19	457·40	510·14	563·51	617·53	672·28	727·84	784·22	841·58	899·84	959·18	1019 59	1081·18
·025	100·064	150·217	200·51	251·00	301·73	352·7	404·11	456 85	508·03	560 69	613·88	667·64	722 06	777·11	832·92	889·48	946·86	1005 08	1064·22
·02688	100·057	150·193	200·46	250·88	301·55	352·45	403·66	455·22	507·15	559·52	612·37	665·71	719·62	774·14	829·29	885·13	941·73	999·08	1057·22
·02926	100 056	150·170	200·40	250·79	301·36	352·16	403·23	454·59	506·30	558·38	610 88	663·84	717·29	771·27	825·80	880·94	936·76	993·21	1050·42
·03269	100 043	150·143	200·34	250·66	301·15	351·82	402·72	453·87	505·56	557·41	609 62	661·88	714 58	767·93	821·76	876·12	931·00	986·46	1042·50
·03631	100·034	150·115	200 27	250·53	300·92	351·46	402·18	453·10	504 26	555·68	607·37	659·937	711·68	764·37	817·34	870·93	924 45	979·22	1039·08
·05	100·023	150·077	200·18	250·36	300·62	350·98	401·46	452·08	502·87	553·80	604·93	656·27	707·85	759 63	811·69	864·03	916·64	969·59	1022·82
·075	100 015	150·046	200·11	250·21	300·37	350·68	400·87	451·24	501 69	552·26	602·93	653·73	704·65	755·72	806 94	858 33	909·89	961·62	1013·54
·10	100·010	150 033	200·98	250·15	300·27	350·42	400·63	450·89	501·23	551·63	602·12	652·70	703·37	754·14	805·03	856·03	907·16	958·44	1009·83
·125	100·008	150·027	200·06	250·12	300·21	350·34	400·50	450·72	500·98	551·31	601·70	652·16	702·70	754·32	804·03	854·53	905·74	956·75	1007·87
·150	100·007	150·023	200·05	250·11	300·18	350·29	400·43	450·61	500 84	551·12	601·45	651·84	702 30	752 93	803·43	854·12	904·88	955·75	1006·70
·175	100·006	150·020	200·05	250·09	300·16	350 26	400·39	450·55	500·76	551·01	601·31	651·66	702 08	752·56	803·10	853·72	904·42	955·19	1006·06

TABLE IV.—LENGTH OF UNSTRESSED CONDUCTOR AT DATUM TEMPERATURE (*zero stress*).

Formula: $L_0 = \dfrac{L}{1 + P/AE}$ (where E = 18,000,000).

A/l.	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1,000
·01453	99·981	150·267	200·90	252·00	303·68	355·95	409·21	463·41	518·57	574·91	632·57	697·59	752·19	814·38	878·15	944·04	1011·88	1081·76	1153·84
·01629	99·956	150·122	200·55	251·34	302 53	354·33	406·53	459·51	513·24	567·75	623·30	679·87	737 42	795·81	856·28	917·72	980·63	1044·96	1126·33
·01815	99·937	150·105	200·50	251·25	302 39	354·00	406·18	459·11	512·56	566·92	622·30	678·87	735 33	794·02	853·58	914·55	976·75	1040·46	1105·63
·02061	99·916	150·038	200·35	250·94	301·84	352·65	404·90	457·09	510·06	563·57	617·83	672·88	728·73	785·51	843·32	902·18	962·13	1023·22	1085·58
·02164	99·911	150·019	200·30	250·84	301·68	352·88	404·50	456·62	509·27	562·55	616·48	671·14	726·60	782·89	840·13	898·31	957·45	1017·86	1079·34
·025	99.896	149·965	200·17	250·58	301·22	352·16	403·43	455·68	507·17	559·75	612·85	666 52	720·85	775·80	831·52	887·99	944·27	1003 40	1062·43
·02688	99·890	149·942	200·12	250·46	301·05	351·86	402·99	454·47	506·30	558·58	611·35	664·60	718 42	772·85	827·91	883·65	941·15	997·41	1055·45
·02926	99·883	149·920	200·06	250·37	300·86	351·57	402·56	453·83	505·50	558·45	609 86	662·73	716·09	769·98	823·42	879·47	935·20	991·55	1048·66
·03169	99·877	149.893	200·00	250·24	300·65	351·24	402·05	453·12	504·72	556·48	608·60	660·78	713·40	766·65	820·39	875·66	929·45	984·82	1040·77
·03631	99·869	149·867	199·94	250·12	300·43	350·88	402·52	452·35	503·43	554·76	606·37	658·28	710·51	763·11	815 99	869·48	922·92	977 60	1033·37
·05	99·863	149·837	199·86	249·96	299·94	350·42	400·82	451·36	502·07	552·91	603·96	655·22	706·80	758·41	810·39	862·65	915·20	968·04	1020·58
·075	99·861	149·818	199·80	249·83	299·91	350·15	400·26	450·55	500·93	551·42	602·01	652·74	703·58	753·57	805·71	857·02	908·51	960·16	1012·01
·10	99·863	149·812	199·79	249·78	299·83	349·91	400·04	450·23	500·49	550·82	601 24	651·74	702·34	753·03	803·85	854·77	905·83	957·03	1008·36
·125	99·864	149·811	199·77	249·76	299·77	349·83	399·92	450·07	500·26	550·52	600·84	651 22	701·69	752·24	802·87	853·30	904·44	955·37	1006·43
·150	99·869	149·814	199·77	249·76	299·76	349·81	399·88	449·99	500·15	550·36	600 62	650·94	701·33	751·89	802·32	852 94	903·63	954 43	1005·32
·175	99·872	142·818	199·78	249·75	299·76	349·79	399·85	449·94	500·09	550·28	600·50	650·79	701·15	751·55	802·02	852·58	903·21	953·91	1004·72

different temperature and loading values, in terms of span length and sag. In this way the values of sags for any span and for different temperatures are found.

(3) Plot curves for the size of conductor and one or more spans, in terms of sag and a full range of temperatures. As most lines often keep to one size of conductor and to one or two lengths of span, a curve of this nature should be found very useful (see fig. 1, p. 292).

(4) Plot sag curves for the spans used and for different temperatures, in terms of *all* sizes of conductor and sag values.

(5) Plot sag and tension curves for each size of conductor in terms of different loadings and different temperatures for different spans. In this way any intermediate value of sag and tension is found. (The tension values are obtained from the general formula: $P_1 = l^2 w / 8D'$ or $P_t = l^2 w / 8Dt$ where D′ and D_t are the sag values given in Table V.)

Sags for the most severe weather conditions, which conditions are specified by the British Electricity Commissioners, are given in Table II for different sizes of conductor A, different spans l, and different tensions P. In the use of the parabolic equation, which is used herein, it is fortunate that, at the outset, the factors P, l and w are well established, so that the resulting sag D and the corresponding length L of conductor for spans up to about 800 ft. can be relied upon for accuracy.

The actual (or original) length of conductor, *i.e.*, the length of the parabolic curve, under the same conditions governing Table II, have been calculated for different sizes of conductor A, different spans l, and different sags D; these are given in Table III.

The most economical span-range for hard-drawn copper is under 850 ft.; therefore, up to this range, the values of L and L_0 given in Tables III and IV are almost as accurate as they would be if calculated from the catenary equation.* The values of L and D may also be plotted on one chart in terms of P for the different sizes, and the desired sag values for different temperatures and loading obtained just the same as with the "Thomas" chart. Or, if desired, we may divide the tabulated values for L, D and P by the respective spans l, and prepare a chart on the basis of a 1-ft. span for a 1-lb. per ft. length of conductor, which would serve for any material, size, weight, loading and span; or we may use the formulæ: $P = (1/8)\ (l^2 w/D) =$ (tension for unit span); and $L = l + (8/3)\ (D^2/l) =$ (length for unit span), which amounts to the same thing. We would thus have P, D and L values for unit span for any conductor material, weight, size, &c. These values, if plotted on logarithmic paper in terms of P for L and D, will give a straight line for L and a straight line for D values.

The next step in the calculations for sag is to determine the unstressed length of conductor in the span. In Table IV it is seen that if all the stress were removed from the conductor, the span would show, in a great many cases, a less length than the actual span length. For different sizes of conductor, different spans and different lengths L, values for the unstressed length L_0 at zero temperature (or datum) have been calculated; these values are given in Table IV.

Under the above-mentioned conditions the effect of temperature is not taken into account. If now we assume the temperature to rise t°F., then the length of the conductor—still without stress—would increase with the increase in temperature. For the different sizes A of conductor, different spans l, different temperatures t°F., and different lengths L_0, the values of L have been calculated.

* See Electrical Review, September 11th, 1925, giving sag calculations using the catenary equation.

(To be continued.)

The Centenary of Volta.

His Career and Important Inventions.

By T. B. FOWLER.

THE centenary of Alessandro Volta, whose name has been applied to the volt, the practical unit of electromotive force, occurs to-morrow. The event happily coincides with a period of rapid electrical development, which in this country is marked by the scheme for reorganising the whole of our electricity supply.

When he died, on March 5th, 1827, Volta had gone far towards solving phenomena which had mystified men for over two thousand years. Thales, one of the seven sages of Greece, was the first to discover the electrical properties of amber, as early as 640 B.C. Centuries passed before any notable advance in knowledge was achieved. Then William Gilbert, Queen Elizabeth's physician, found that other materials besides amber were capable of electrification by friction. A succession of developments paved the way for Volta's great discoveries. Galvani, in 1791, revealed some of the wonders of electricity and performed pioneer service of the utmost value; but poverty and disease prevented him from following up his discoveries, and it was left to Volta to elaborate the theory of current electricity along purely physical lines.

Volta, who came of an aristocratic family, was born at Como on February 18th, 1745. It was a time of upheaval in Europe, and Maria Theresa, of Austria, was prosecuting an ambitious war of conquest in Italy.

Invention of the Electrophorus.

Through the troubled and difficult years that followed the invasion, Volta's education proceeded to good purpose. His special aptitude for electrical discovery was manifested as early as 1769, when, a young man of twenty-four, he addressed a Latin dissertation to Beccaria, entitled "De Vi Attractiva Ignis Electrici," which is historically significant for the fact that it announced his earliest invention—the electrophorus.

In its essential simplicity it struck the keynote of the mental processes which Volta brought to bear in wresting from Nature the truth respecting her most secret operations. All that it consisted of was two circular metallic plates, between which was a round disk of resin, which was excited by being struck a number of times with either a silk kerchief or pieces of dry, warm fur or flannel.

In 1774 Volta was appointed to a professorship of physics in the gymnasium of his native town. Five years later, when a chair of physics was founded at Pavia, he became its first occupant. Journeys to Switzerland, France, Germany, Holland, and England enabled him to compare notes with some of the most advanced scientific thinkers of the day.

About 1782 he announced two more important discoveries. The first consisted of what he described as

an electrical condenser, an adaptation of the electrophorus by the substitution of a plate of marble or varnished wood for the disk of resin; the second disclosure was the existence of negative electricity in the vapour of water, the smoke of burning coals, and the gas produced by dissolving iron in weak sulphuric acid.

But the achievement which, above all others, entitles him to rank among the greatest scientific discoverers, was his demonstration of the development of electricity in metallic bodies, and the production of the "pile" which perpetuates his name. Here, again, the scientist presented a device capable of comprehension by those least versed in technicalities. His pile was constructed of an equal number of zinc and copper disks, alternating with circular plates of cloth, paper, or pasteboard soaked in dilute acid or salt water.

Demonstration Before Napoleon.

Thus Volta, in the words of Dr. Dickerson, gave to the world a new manifestation of electricity, presenting it in a form in which "this subtle agent is far more manageable than in the form of static electricity. By the use of galvanic batteries a current of low tension, but of enormously greater power, can be maintained with little difficulty, whereas static electricity is like lightning and readily leaps and escapes on the surfaces on which it is confined."

The discovery of the electric current appears to have been made a year or so after Volta's marriage, which took place in 1794, but it was not announced until March 20th, 1800, when Volta communicated the facts in a letter to Sir Joseph Banks, who conveyed the news to the Royal Society. Volta had been awarded the Copley Medal in 1791, and further distinctions were conferred upon him in 1801, when he demonstrated his theories and conclusions before the members of the National French Institute.

Among those who attended the lectures was the First Consul, Napoleon, who was quick to perceive the importance of Volta's discoveries. On his initiative a gold medal was struck in Volta's honour. Napoleon added a gift of 6,000 francs and the Cross of the Legion of Honour. Volta was elevated to the dignity of a senatorship of the kingdom of Lombardy, and in 1815 the Emperor of Austria appointed him to the directorate of the Philosophical Faculty of Padua.

Napoleon had been specially impressed by Volta's experiments in the electrochemical decomposition of water, and it is an interesting fact that, as an outcome of the physicist's visit to Paris, a commission, which included such eminent scientists as Laplace, Coulomb, Halle, Fourcroy, Brisson, Sabathier, and Biot, was appointed to repeat his experiments on a large scale.

Volta was as industrious as he was ingenious, and his active career was marked by an almost unbroken succession of discoveries. Apart from those already indicated, his gifts to science included a device for testing the amount of oxygen in the air; he was responsible for much useful exploratory work as regards heat and gases; and he is credited with being the first to entertain the idea of an electric telegraph.

In support of this claim, Sir Francis Ronalds refers, in a letter, to an autograph manuscript wherein Volta states that he does not doubt the possibility of exploding his "electrical pistol" at Milan through wires supported by posts whenever he discharges a powerful Leyden jar at Como.

Knowledge for the Sake of Knowledge.

Volta combined with acute intelligence and clear insight, lofty ideas and transparent sincerity, the rarest personal modesty. He is described by those who knew him as being entirely free alike from ambition, thirst for wealth, or jealousy. He pursued knowledge for the sake of knowledge alone.

Scattered throughout the letters and memoirs which he accumulated was a wealth of informative detail respecting his researches, but he shrank from publicity, and it never occurred to him to embody the material in book form.

It needed Faraday's discovery of the induction of electric currents, and the creation of currents by the motion of conductors in magnetic fields, to open up the era of modern electrotechnics, but Faraday himself generously and ungrudgingly acknowledged the debt of obligation which science owed to Volta for the removal of what he described as "doubtful knowledge."

"Such knowledge," he declared, "is the early morning light of every advancing science, and is essential to its development, but the man who is engaged in dispelling that which is deceptive in it, and revealing more clearly that which is true, is as useful in his place, and as necessary to the general progress of science, as he who first broke through the intellectual darkness and opened a path into knowledge before unknown."

Volta spent his last years in retirement at Como, and there, amidst the friends and scenes he loved best of all, a great, simple-minded and affectionate man, and an earnest student to the last, he passed away at the advanced age of eighty-two.

The Factor's Catalogue.

Some aspects of a field of publicity work which is little exploited.

By A. J. SMITH.

THE majority of manufacturers appreciate to a greater or less degree the important *rôle* of the catalogue in sales promotion work, but in many cases it is not so fully appreciated that the publication of the maker's own lists does not exhaust the possibilities for effective publicity in this line, for there still remains the large number of catalogues issued by wholesalers, factors, or export merchants in which are embodied details of various manufacturers' productions, many of which have a circulation as wide as that enjoyed by the makers' own sales literature. It is seldom indeed, that the edition of any catalogue is less than four or five thousand copies, while the amount of care used in its distribution is usually precisely in proportion to its cost. Broadly speaking, space in a factor's catalogue of any kind is only a shade inferior in value to the maker's own lists and in estimating its value it is interesting to note that in certain trades, notably in the radio industry, there are one or two wholesalers' catalogues which are frequently preserved and used by buyers in preference to the lists of the actual makers,

on account of the better arrangement and classification, as well as the more varied range of information which they contain. The important point in connection with all such extraneous publicity is that if an article is once included in a factor's catalogue of any kind, orders are bound to follow sooner or later. It might be thought therefore that there would be very considerable competition on the part of makers generally to secure representation in such a work, but this is by no means the case. Far from being bombarded with offers from makers to collaborate in every conceivable way in the preparation of his sales literature, the average factor or merchant in any line has to extract details piecemeal by dint of much hard work from apparently indifferent or hard-pressed makers. Copies of the latter's standard sales literature are usually obtainable without much trouble, but if special information or additional details are required, it is quite a different matter. On the question of the loan of blocks or electros, it is surprising how many are the manufacturers who consider that they should be paid for these, and if a block should ever be required of a special size, or without the maker's name or trade-mark appearing, there are yet greater difficulties, and the maker's "take it or leave it" attitude becomes still more pronounced. There are in fact cases where makers have declared that they would not dream of allowing an illustration to be published of any product of theirs which did not bear their name! In the compilation of an export catalogue, it is often possible to waste weeks if not months in the endeavour to obtain a list of standard sizes and prices from some maker whose motto is "Prices and Particulars upon Application." Fortunately, however, it is usually possible to find a competing maker who is a little more complaisant or farsighted as to the ultimate possibilities, and who consequently gets his own productions listed, while the other is left to point to the coal strike, the unsettled state of export markets, or some equally plausible reason as an explanation of lack of business. In such a trade as radio, for instance, one may come across instances of important wholesalers' catalogues being held up for a couple of months at the critical time of the commencement of the winter season owing to the failure of manufacturers to supply details of their new models in good time.

Although practice differs from trade to trade, there are one or two general considerations which require to be borne in mind by the manufacturer who wishes to obtain adequate representation in a wide range of different factors' and wholesalers' catalogues. In many trades where the merchant's position is not very clearly defined, it is practically an essential condition that the block used must not show the maker's name or trade-mark. If the factor's position is at all ambiguous, it is obviously not good policy for him to show who are the actual makers of the goods listed. The provision of plain blocks, or the offer to provide them upon request will often be a considerable "pull" in securing representation in any pages of this kind, as will also the offer to provide blocks of a size to suit the pages for which they are to be used.

In the majority of lines listed, the average factor naturally prefers an illustration showing a conventional type of article which may fairly be held to represent general practice, in preference to illustrating something of special or unconventional design, which in case of business can only be obtained from one source. Obviously it is very desirable that a factor should have alternative sources of supply in case of unexpected increases of price, or inability to obtain reasonable delivery, and it is considerations of this nature which usually render necessary a great amount of sub-editing of the manufacturer's descriptive matter and the deletion of many selling points which may distinguish a particular article from others of its class, so that the resulting description is in such general terms that it may apply equally well to several different makes. But in spite of all sub-editing due to such considerations, the maker whose article is illustrated and whose description is adopted retains a decided advantage when it comes to filling orders which may have resulted from a distribution of the catalogue.

The time or trouble which may be necessary to get one's products listed in merchants' catalogues is well-spent, though the value of the work is apt to be disregarded as the securing of an order is not the *immediate* result; but though the primary result is propaganda space only, the writer has never yet encountered a case of the listing of goods in factors' catalogues which did not result in orders sooner or later. In fact in certain lines of engineering goods, where patterns are standardised and designs change but little from year to year, the useful effect of an appearance in a substantial catalogue is enormous, and the writer has traced business coming along regularly for periods of fifteen years and over as a consequence of a particularly well-compiled catalogue of this description.

The essentials which require to be borne in mind by the maker who desires his products to be widely listed by merchants and wholesalers are generally:—(1) He must be prepared to supply blocks without any name appearing; (2) they must be of a suitable size for the publication for which they are intended; (3) the descriptive matter should be drawn up to follow the general plan of the catalogue for which it is intended, and of the exact length to fill the space which can be alloted without sub-editing; and (4) the particulars require to be drawn up with the same care and the same promptitude as would be used in the case of the maker's own lists. There are few factors who would not appreciate attention upon these lines. In fact, it only requires some little experience of the results which can follow a more progressive policy with regard to this type of propaganda to show that there exists here a field for indirect salesmanship which though comparatively little cultivated, is yet capable of bringing in remunerative results spread over long periods.

Supervisory Traffic Control for Hudson Tunnel.

An electrical protective system, based on the supervisory control system developed for railway and power stations and modified to meet the particular local conditions, will ensure safety in the Holland vehicular tunnel between New York and New Jersey, U.S.A. An order totalling half a million dollars for the necessary equipment has been awarded by Messrs. Fischback and Moore, electrical contractors, to the Westinghouse Electric and Manufacturing Co. Three kinds of traffic signals will direct motorists using the tunnel: green for "go ahead"; red for "stop," and a special "stop-engine" signal. These lights will be spaced 240 ft. apart; traffic officers every 480 ft. will patrol the tunnel, and for each there will be a traffic-light control station and a telephone. A board located in the administration building in New York and carrying 926 pilot lamps will inform a central operator of everything going on within the tunnel, and will enable him to stop traffic at any desired point, and he only can reset the signals. The pilot-light board in the control room will show, in addition to the position of the traffic lights, definite signals indicating the state and speed of every piece of ventilating apparatus and the conditions of every circuit serving the tunnel. If anything fails, a bell will ring, and a bright light will indicate the location and character of the trouble. When everything is in good order, the pilot lights will burn dimly, so that a bright light will instantly attract attention. The 84 ventilating fans will be on six independent circuits. Normally the power supply will be divided between New York and New Jersey, but any piece of apparatus can be supplied from any source the operator desires, and all switchgear is to be interlocked. The tunnel will be illuminated by lamps spaced every 20 ft., except at the entrances, where they are spaced every 10 ft. to help in counteracting daylight. The tunnel will be opened to traffic early in the summer of 1927.

The Accumulator Makers' Association.

Third Annual Dinner in London.

THE annual dinner of the Accumulator Makers' Association was held at the Savoy Hotel in London on February 21st, Mr. B. M. Drake presiding over a company numbering about 200.

The loyal toast having been honoured, "The Accumulator Makers' Association" was toasted by Mr. J. S. HIGHFIELD, who remarked that the public's impression that the function of associations was price arrangement was quite wrong; they enabled resources to be pooled, so that business could be built up securely, and were not "trusts," as they kept up competition. They had a right to the profit they made, otherwise they would have no resources wherewith to back up progress, and, moreover, profit was a standard whereby efficiency could be gauged.

Mr. B. M. DRAKE, in reply, claimed that the Association had benefited all concerned. The industry was now in a flourishing condition and able to hold its own at home and in foreign markets, too, in spite of the fact that protection did not exist in this country as it did abroad. Last year the value of exports reached £871,000, whereas imports were only valued at £53, which figures showed that they were not abusing their position, or overcharging for their goods. He welcomed the publicity which the electrical industry had obtained during the passage of the Electricity (Supply) Bill through Parliament, as it could not fail to benefit all branches, including that of accumulator manufacture. Some doubt had been expressed as to the effect on the accumulator trade of the spread of alternating current, but, in spite of the undoubted fact that many had held back their orders last year owing to uncertainty as to the final form the Bill might take, it was satisfactory to be able to record that the output of accumulators had actually increased during that period. When electric light was introduced timid shareholders hastened to sell their gas shares, but the very utility of an appliance invited the appearance of a competing alternative, and two good alternatives always benefited each other. Only a small proportion of the population was at present using electric light and power, and the extension which was expected to follow the widespread network of mains would so popularise electricity that many who were not within reach of them would consider themselves behind the times if they did not purchase private plant, of which an accumulator formed an essential part in order to obtain security, steadiness, and economical working of the engine. In a.c. generating stations there was a growing market for emergency batteries to light the buildings when a breakdown occurred, in which respect they were following the lead of America, where large emergency batteries had proved their utility. The serious losses which would occur in works if the electricity supply failed would justify the use of accumulators as an insurance against breakdown, and in hospital operating theatres and for other vital services accumulators might well be made compulsory. He looked with confidence to the future of the accumulator industry.

Mr. D. P. DUNNE, in proposing "The Electrical Industry and the Guests," referred to the talk heard on every hand of a coming revival of trade; the best augury was the fact that the people were looking for it, they expected it. In addition, the Electricity (Supply) Act, designed to stimulate the public, had been passed with progressive notions for fostering the use of electricity. However, the industry did not consist solely of the generating stations, and they must not depend too much on the Act alone, for an Act that was not put into operation properly became destructive. Development would, therefore, depend upon the efforts that were put forward from within the industry itself, but they still had to contend with competition from abroad, and the greater their own efforts were the greater would competition be.

Sir DUNCAN WATSON, in responding, intimated that the Central Electricity Board and the Electricity Commissioners would welcome suggestions for improving load factor, because doubling the l.f. would halve the cost. He considered it pertinent to remind the assembly that four years ago the all-electric house was a dream; to-day it was a practical reality, and it had come to stay, and if they progressed on those lines this would be a happier and more prosperous country in future than it had been in the past. No better chairman of the Board than the one chosen could have been found to solve a very tangled scheme; the Board's composition and the manner in which it had been received indicated that the Government meant business. The electrical Press, which had always been independent, had not been afraid to say what it thought and to give credit where it was due. He hoped the industry would close up its ranks and render that assistance to the Board which it so much needed.

Mr. J. W. BEAUCHAMP also replied to the toast, pointing out how representative of the electrical industry was that night's gathering.

In addition to the much appreciated songs of Miss Edith Furmedge and Mr. Thorpe Bates, accompanied by Mr. G. H. Ison, the band of the Royal Regiment of Artillery rendered a programme of music which added to the enjoyment of the evening.

Legal.

Wareham Electric Supply Co., Ltd.

ALLEGATIONS OF FRAUD.

IN the Companies' Winding-up Court, on February 22nd, Mr. Justice Romer had before him, as briefly mentioned in our "Business Notices" last week, the petition of Mr. W. E. Weston, of Spring Grove Road, Hounslow, a shareholder, for an order for the compulsory winding-up of the above company.

Mr. C. A. BENNETT, K.C., who appeared for the company, said the petition was by a gentleman who, in one part of his petition, said he was a fully-paid shareholder, and in another that he had repudiated the allotment of the shares to him. The petition was one of the longest he had ever seen—it contained 68 paragraphs—and throughout it made charges of fraud against those concerned in the management of the company. He was going to ask his Lordship to say that the statutory affidavit should not be regarded as sufficient, but that the allegations should be properly verified by another affidavit.

His LORDSHIP: Where is the fraud alleged in the petition?

Mr. BENNETT: It is alleged throughout.

His LORDSHIP: I see in one paragraph it says "the said shares were created in fraud of," &c.

Mr. BENNETT said in another paragraph it was stated that there was "deliberately withheld from your petitioner all such material facts and information in order to mislead and deceive your petitioner and others who might be induced to apply for shares or debentures in response to the said prospectus."

His LORDSHIP: Is the company in voluntary liquidation?

Mr. BENNETT said the petition in one place alleged that it was, and in another that an order was made in the Dorsetshire County Court staying the voluntary liquidation. The conclusion seemed to be that the company was still in voluntary liquidation. It was impossible, he thought, from the petition to understand what the petitioner's real case was against the company.

Mr. R. J. WILLIS, for the petitioner, said this was a serious case, and the facts were somewhat unusual. According to the petition there was very gross fraud by those concerned with the company.

His LORDSHIP: You had better file proper evidence in a detailed affidavit. Is the company still carrying on business?

Mr. WILLIS said that only in the last day or two one of the directors of the company had sent out a circular to the shareholders of this and four other companies suggesting that some trust should be formed.

Mr. GALBRAITH, K.C., said he appeared for the liquidator, whose duties were supposed to have come to an end in 1923, when the voluntary winding-up was stayed. What he wanted to know was whether he was still liquidator or what had happened.

Mr. WILLIS: I say the company is still in voluntary liquidation, but it may not think so.

His LORDSHIP adjourned the petition for 14 days for the filing of further evidence, and said that in the meantime the company would deal with the assets only at its peril.

Montreal Tramways and Power Co., Ltd.

MR. JUSTICE ROMER, in the Chancery Division on February 22nd, sanctioned a scheme of arrangement of the finances of this company.

Mr. LINDEN, for the company, said it was entirely controlled by a board in Canada, and most of the shareholders were there. The scheme was in reality a reconstruction. The company was registered here and the scheme provided for shares of a Canadian company, called the Montreal Tramways Co., to be issued to the liquidator of the present company, and for the Canadian company to take over its liabilities and pay for the winding up. The scheme also provided for a reduction of capital, as according to the laws of Quebec it was liable for taxation on the amount of its actual capital and at the same time to taxation here

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British Thomson-Houston Co., Ltd., v. Mullard Radio Valve Co., Ltd.

A MOTION by the British Thomson-Houston Co., Ltd., against the Mullard Radio Valve Co., Ltd., was mentioned to Mr. Justice Tomlin in the Chancery Division, on February 25th.

Mr. WHITEHEAD, K.C., for the plaintiff company, said the motion was for an injunction to restrain the alleged infringement by the defendant company of certain patents. It had been adjourned until that day to enable the defendant company to answer his affidavit, and it was a term of the adjournment that the defendant company would let his clients have the affidavits in answer by February 23rd. The defendant company was unable to let him have two of those affidavits until February 24th, and those affidavits he (Counsel) wished to

answer. But there were certain negotiations proceeding between the parties, and he hoped that if his Lordship would allow the motion to stand over for 14 days it might be possible to dispose of the whole matter without its coming into Court.

Mr. R. Moritz, K.C., for the defendant company, said, without prejudice to the position which he took up that the motion was wholly misconceived and ought never to have been brought, he had no objection to the adjournment asked for.

His Lordship granted a further adjournment, and said that Mr. Moritz's statement would not interfere with anything which he might say on behalf of the defendant company when the motion came on again.

Birmingham District Power and Traction Co.

Corporation Profits Tax Appeal.

In the Court of Appeal on February 23rd the appeal of the Birmingham District Power and Traction Co. from a decision in favour of the Income Tax Commissioners, given in the King's Bench Division by Mr. Justice Rowlatt, was allowed. The company claimed that its profits and those of three omnibus companies which it owned should be assessed for corporation profits tax together. In this case two years' exemption could be claimed under the Act as the company was a public utility company, while it lost £1,500 in exemptions (£500 for each subsidiary).

Costs of Opposition to Dublin Electricity Bills.

In the High Court, Dublin, recently, the Dublin Corporation and the Liffey Syndicate, Ltd., applied for liberty to plead in defence of an action brought against them by Col. R. C. Cane that a Parliamentary Committee which awarded costs to Col. Cane in respect of his opposition to electricity supply Bills promoted by the defendants was acting *ultra vires* and was not lawfully constituted. The judges held that the application of the Liffey Syndicate, Ltd., should be refused, but they gave the Corporation liberty to plead, as the preamble of its Bill was proved, although the Bill was subsequently withdrawn.

An Unlicensed Transmitter.

On February 18th, Eustace Dennes, electrician, Chorlton-cum-Hardy, was charged with working a radio transmitting station without a licence. It was stated that the defendant had used another's call sign; he admitted working the station. A fine of £10 was imposed.

Parliamentary News.

[By Our Special Parliamentary Reporter.]

The Electricity Board.

On February 22nd, Mr. Montagu asked the Minister of Transport whether members of the Electricity Board, apart from the chairman, could hold other lucrative posts or retain separate commercial interests.

Colonel Ashley said that the answer was in the affirmative. None of the members of the Central Electricity Board, other than the Chairman, was required by his appointment to devote the whole of his time to the performance of his duties as a member of the Board. Under Section 1 (4) of the Electricity (Supply) Act, 1926, however, a member of the Board, if interested in any company with which the Board had, or proposed to make, any contract must disclose to the Board the fact and nature of his interest, and might take no part in any deliberation or decision of the Board relating to such contract.

Broadcasting.

On February 22nd, the Prime Minister informed Captain Fraser that he could not give an opportunity for a debate on the question of the broadcasting of the proceedings of the House of Commons. He also was not prepared to set up a Select Committee, as he was unaware of any change of opinion on the question of broadcasting Parliamentary debates

Mr. Day asked the Postmaster-General if he could state the number of licensed wireless listeners in Great Britain on the last convenient date, together with the comparative figures for Germany, Sweden, Denmark, Hungary, Switzerland, and the United States.

Sir W. Mitchell-Thomson said that the latest available figures which were properly comparable were those for December 1st, 1926, *viz.*:—

Great Britain and Northern Ireland	2,130,000
Germany	1,337,122
Sweden	238,000
Denmark	114,492
Hungary	53,070
Switzerland	51,751

There was no licensing system in the United States, and no official statistics of the number of wireless receiving stations were available.

The North Metropolitan Bill.

The Times states that the Bill to raise £2,250,000 new share and loan capital which has been introduced into the House of Lords by the North Metropolitan Electric Power Supply Company will proceed as an unopposed measure through that House.

The National Association of Supervising Electricians.

Annual Dinner.

On Saturday last the annual dinner of the N.A.S.E. was held at the Holborn Restaurant, the president, Mr. A. M. Sillar, M.Inst.C.E., occupying the chair.

After the loyal toast, Mr. W. E. Highfield, M.I.E.E., proposed "The Guests," ascribing the success of the Association largely to those who came to its banquets and meetings. Mr. F. Palmer, President Inst.C.E., who responded, expressed the cordial goodwill of the Institution towards the Association. Mr. W. W. Lackie, C.B.E., Electricity Commissioner, also responded, and undertook to prove that all the guests were "supervising electricians." He warmly commended the work of the Association in connection with the I.E.E. Wiring Rules, pointing out that no body of men could know better what wiring rules should be.

Sir R. Burton Chadwick, M.P., proposed "The Association," which he described as a body representing trade unionism at its best. The campaign in favour of industrial peace that was in progress dealt with the dominant factor in our national life: since the Armistice we had lost more money and time than all other industrial countries together. Unless the people of this country realised the complete interdependence of capital and labour the outlook would be black. The Association exercised an immense influence in favour of sane trade-union leadership; next year it would dine under a new title.

Mr. Sillar, responding, said the term "electrician" was honoured in the early days, but in 1889 the Society of Telegraph Engineers and Electricians became the Institution of Electrical Engineers; the Association was adopting the title "Association of Supervising Electrical Engineers," which was more in accordance with the duties performed by its members.

Mr. Alan Kirk, A.M.I.E.E., chairman of the N.A.S.E., also responding, said that membership of the Association was now recognised as a hall-mark of professional efficiency; as a non-political trade union with the highest ideals, it provided numerous benefits for its members. Last year it experienced a most trying time, but came through without a wry word, thanks to the leadership of Mr. E. North and the loyal support of the Board and the members, and to the guidance of the general secretary, Mr. A. Brammer. Their position in the industry was now recognised; a suggestion that an abridged version of the I.E.E. Rules should be prepared had been referred to the Association and the E.C.A. in collaboration. The name of the Association would be changed on April 1st, and the scope of membership would be enlarged to include the commercial electrical engineers. He proposed the health of the first Board of Control, of 1914. and Mr. Stiling responded, describing the early struggles out of which the Association came into being.

Mr. E. North, M.J.Inst.E., proposed "The Industry," for which, he said, the prospects were now bright, provided that every man did his best; they needed initiative, economy, and efficiency—and less preaching.

Col. R. K. Morcom, C.B.E., chairman of the B.E.A.M.A., responded, forecasting victories for the close association of science and practice, and deprecating the too-common tendency to depreciate our national achievements, a result of the mixed thinking which pervaded politics and fed on statistics and catchwords If all did their best to make good the losses of war and the losses of peace, the future of the industry would be a rosy one.

Mr. J. S. Highfield, M.I.E.E., after expressing the desire of the past-presidents (who were all present except Mr. A. P. Trotter) to help and advise the Association at all times, proposed the health of the general secretary, which received musical honours. Mr. Brammer, in acknowledgment, attributed the success of the Association to the loyal support of the presidents and past-presidents, backed up by the yeoman service of the Boards of Control, and said the Association was now composed of men who had the right to call themselves supervising electrical engineers.

The speeches were interspersed with music and song, and the evening was thoroughly enjoyed.

Reviews.

Condensing Plant. By R. J. KAULA and I. V. ROBINSON. Pp. xiii+400; figs. 245. London: Sir Isaac Pitman and Sons, Ltd. Price, 30s. net.

While the reciprocating steam engine held the field, condenser design remained more or less stagnant, for this form of prime mover could not effectively utilise a higher vacuum than about 26 in. Hg. This degree of vacuum was easily obtained. With the advent of the steam turbine it became apparent that this new prime mover could effectively utilise much higher vacuum. The realisation of the thermal gain to be achieved by exhausting to a higher vacuum caused attention to be directed to the design of condensing plants. Numerous workers attacked the various problems concerned, but the results of their work, when published at all, were more or less in the form of studies of individual factors affecting condensation, and were scattered among papers to technical institutions, and in the various technical journals. It is only recently that any attempt has been made to collect the scattered data, co-ordinate the same in the light of modern experience, and present the result as a co-ordinated whole affecting condenser design and operation.

From being a cast-iron box stuffed full of tubes, located in any odd place, the condenser has risen in importance, until now it ranks with the boilers and turbines. Power plant sites are largely determined by the facilities offered for condensing purposes.

The authors have set out to treat the subject from the standpoint of the user as well as that of the designer and student. This standpoint is a commendable one, for the number of users is greater than that of designers, and also probably their need is greater. It may be said at the outset, that the volume under review is a notable contribution to the literature on condensing plant, and affords all who are interested an opportunity of becoming acquainted with the essentials of design and operation, and with the latest developments in condenser-plant practice, for the most recent improvements are included and given adequate notice.

After a brief summary of the various types of condensing plant, the effect of vacuum on turbine economy is discussed. The fact that there is an optimum value for vacuum, for given circumstances, is brought out. The authors do not mention that the thermal gain realised depends to a large extent upon the design of the exhaust stages of the turbine, and further that the actual gain at turbine full load rapidly falls away from that theoretically possible after about 28.5 in. Hg vacuum has been reached. Until the advent of bleeding for feed heating, the optimum thermal efficiency at full load was reached with about 28.9 in. Hg vacuum, even for turbines having a double-flow low-pressure cylinder. At higher vacuum the loss of heat from the condensate outbalanced the gain in steam consumption, for the actual gain in steam consumption below this degree of vacuum is very slight indeed. The advent of bleeding extended the optimum value. Chapter 3 gives in detail the calculations necessary for estimating the quantity of circulating water, and gives values commonly used in modern practice.

Eight chapters are then devoted to surface condensers, starting with the principles of design, following on with an exhaustive examination of the various factors influencing design and operation, and finishing with detailed illustrated descriptions of typical designs of leading makers in this country and abroad. An examination of the various tube plate diagrams of modern designs, shows that designers have all realised the vital importance of presenting the maximum possible cooling surface at the entrance to the condenser, with adequate tube spacing at this point, in conjunction with an entrance of adequate size and shape to render available the maximum amount of cooling surface at the entrance. The reviewer remembers a case years ago, where putting an augmentor steam jet in series with the piston air pump, increased the vacuum at the bottom of the condenser by about 0.5 in. Hg, but the vacuum at the top of the condenser remained practically the same as it was before the jet was on! This was one of the first condensers made for high vacuum (29.1 in. Hg), and the effect of steam friction through the tubes had been overlooked when the tube pitch was settled. Happily such things are no more.

Corrosion, erosion, and tube cleaning are next covered, then come chapters devoted to evaporative condensers, jet condensers of the high and low level type, and ejector jet condensers. The various ordinary and special forms of each type are described, and the relative advantages and disadvantages of each type adequately discussed. It appears to the reviewer that these chapters would have been better placed at the start of the volume.

Eight chapters are then devoted to air pumps. It may be truly said that air-pump performance dominates condenser performance, for a good condenser performance cannot be achieved without a good air-pump performance. Much useless ingenuity has been expended in trying to do with condenser design what can only be done by air pumps. With the advent of high vacuum the limitations of the reciprocating type of pump became apparent. Various expedients were tried to overcome these limitations, the most successful probably being the steam jet augmentor of Sir Charles Parsons. As a matter of fact, a good piston pump with a steam jet augmentor in series will give as good air-pump performance as any modern form of air pump. The limitations of the piston pump led to the development of rotary hydraulic pumps, which proved good from the vacuum production view, but took more power than the piston pump. Then came the development of the steam jet extractor type, the practical advantages of which greatly outweigh any theoretical disadvantage, such as degradation of high-grade heat in an auxiliary, and to-day it is established—and in the reviewer's opinion quite rightly so—as the best form of air pump. The authors' treatment of the various types of air pumps is comprehensive, thorough and unbiased, and will be of great value to operating engineers. The authors devote the necessary attention to adequate provision of air cooling. There is a typographical error on page 231, where fig. 109 is referred to in the text instead of fig. 112.

The book concludes with useful chapters on testing, de-aerating, and closed feed systems. The treatment throughout is thorough, sound, and unbiased. The volume is an attractive one from every point of view—save one—and that is the price. This appears to be on the high side, which is to be regretted, as it may restrict the field of a good book.

J. N. WAITE.

Engineering Factory Supplies. By W. J. HISCOX. Pp. viii+176; 49 diagrams. London: Sir Isaac Pitman & Sons, Ltd. Price, 5s. net.

"The subject matter of this work is the purchase, receipt, storage, and distribution of factory supplies." To most people engaged in industry, this is not a thrilling subject. It follows that if it is to make an appeal it should first of all be readable. But this book suffers, as do so many technical text books, from the lack of an attractive style.

Everybody who is engaged directly or indirectly upon the transformation of raw materials into finished goods in all the multitude of factories throughout the land, should have a sound knowledge of the methods and means of handling the material. It appears to be the author's object to produce a standard text-book that everybody concerned can read. Surely, if it were easily read, it would attract very many searchers for knowledge and guidance. Perhaps, it is too much to expect that those who have the experience should also have the faculty of clear expression. The author certainly has the experience. Now, if the would-be author of the technical text-book, who does not possess the power of expression, would but collaborate with one who is able to write with an attractive style, both the reader and the author himself would benefit vastly. Thus, we must begin this review by exhorting those who have a desire to study this subject to struggle on, neglecting some of the details and shutting their eyes to some of the phraseology which is not helpful, so that they may pick out just those points that matter.

There is a great deal that does matter in the book. The trials and troubles of pilfered stock, late delivery, inefficient production, and lack of fluid capital, can more often than not be traced to the slack methods adopted in so many factories to deal with material supplies. Either there is lack of co-ordination between production, purchasing, storage, and distribution, or the storage of material is looked upon as a very minor function of the business, or, again, there is a distinct absence of that control of stock which is so essential to efficient production.

If one could assess the time lost, the penalties incurred, the deterioration of stock, and the loss of profit due to overstocking in terms of money, the country would be appalled at the waste thus accounted for. One of the prime causes of bankruptcy is undoubtedly overstocking. It is time such a cause were made a criminal offence. It is so unfair to the up-to-date manufacturer, after exercising due control over his own stocks, to have to write off huge sums annually for bad debts, when these debts become cancelled owing to the slack methods of his customers.

In order to avoid overstocking, it is necessary to set very fine limits for the maximum stock to be carried of each line kept in store. The trouble of late delivery is often caused through inattention to minimum stock levels, but of equal, if not greater importance, is the setting of the maximum levels. Even where they have been set, they usually have a large factor of safety, and that factor of safety is the means of tying up big sums of money, which, particularly in these times of financial stringency, are needed as much as liquid capital. Without maximum stock levels, scientifically based, the stocks which do actually grow up are those which are rarely or never used, and which in time, owing to changed demand, never will be used. When this happens, and it is happening in very many factories, wholesale scrapping, or sales at ridiculous prices take place. It depends upon the magnitude of this overstocking in any one factory whether it results merely in a diminution of profits or whether insolvency follows in its wake.

Mr. Hiscox tells us, if not all, a great deal about minimum levels, but he is sadly reticent concerning the maxima. At least half the problem of instituting thoroughly useful stock records centres around the calculation of really sound maximum stock levels.

Then, again, the days of the old card index, whether it be for stock or any other records, are passing. A manager, for instance, has not the time to look through hundreds of hidden cards to find out what he wants to know. He needs a visible record which *tells* him the position at a glance. If he is to

be interested in the stock, as it is most important he should be, the stores organiser must provide him with a picture of the stock rather than a stodgy book about it. The manager must be provided with something that will tell him in an instant what is right and what is wrong. There are several types of visible stock records on the market. Certainly they are more expensive than card indexes, but the ratio of useful service to investment cost is the important, and should be the deciding, factor.

We have not been greatly helped by the index to this work. It has failed to show us where to look for just those points we find most interesting, points that are included in the text. This lack of sufficient indexing is another fault of so many technical books.

There are 41 diagrams. We have seen better forms, but it is, we realise, difficult to include forms that will apply generally, and these can only be regarded as specimens of what might be used. Some of the methods advocated do not appear to be the least expensive compatible with economical working, and that is the acid test of any system. The author neglects to mention the advantages to be gained from the use of certain modern office machines which do facilitate clerical labour.

In introducing any system into a factory, there is always the tendency to over-elaborate the methods employed. It is so easy to get just a little more information than is actually required by the extension of a form, or the introduction of a further record. But it must be remembered that the larger the form or the number of records, the greater is the amount of clerical labour required to deal with them. The test to be applied is whether the purpose served or the added control acquired by such extensions of the system will fully compensate for the extra time needed in factory and office in handling the extra information. It is not enough to say, "This information can easily be obtained, if it is wanted." It is necessary also to show that the service given corresponds with the effort made. An authoritative text book should demonstrate the relative time required and utility gained by each step advocated or suggested.

The following are the main points dealt with by Mr. Hiscox:—The necessity for efficient handling of material; what to stock and who decides; the buyer, his duties, and his relation to other executives; purchasing for stock and for special requirements; receiving, checking, inspecting, and distributing supplies; circulating information regarding stores; the location and layout of storage space; the kinds of stores required and how each is sectionalised; the status of the storekeeper; methods of storing; transport of supplies; records and accounts; errors, and dealing with empties.

The subjects are treated fairly thoroughly and in logical order; the relation of the various people who have to deal with material before and after it is purchased, and their relation to others in the factory, are leading themes throughout the book. A close study of the chapter on errors and how they may be detected, will be of use to all who have to organise stores.

The severity of the trade depression would be alleviated if manufacturers would but see that the old-fashioned methods of organisation are a source of unremunerative expense. Some do, but instead of consulting the experienced organiser, they too often scrap their obsolete system, with the hope that by ridding themselves of one source of expense, they have a chance to recover. When they do come to realise that such a passive attitude does not encourage prosperity, they will, perchance, if they still have some life left in them, turn to those, such as the author of this book, who have studied carefully economical organisation. In the handling of material, both physically, and on paper in the form of records, the expert could, if he were called upon, help to mitigate the wholesale loss which is going on. But the manufacturer must have a reasoned and lucid case laid before him, and so presented to him that he will be compelled to act upon it. If this volume had received the master touch that would have made it not only readable, but also compelling, the author would have done a vast service to British industry. The plans are there, but the draughtsmanship will not commend them to the casual observer.

Department of Scientific and Industrial Research; Technical Papers on Illumination Research: No. 1, The Terminology of Illumination and Vision (9d. net); No. 2, The Transmission Factor of Commercial Window Glass, by A. K. Taylor and C. J. W. Grieveson (6d. net); No. 3, Light Distribution from Industrial Reflector Fitting No. 1, by H. Buckley and C. J. W. Grieveson (1s. net). London: H.M. Stationery Office.

In the course of a discussion before the Illuminating Engineering Society early in the present year, it was stated that details of the investigations undertaken by the Illumination Research Committee of the Department of Scientific and Industrial Research would shortly be embodied in a series of technical papers. The three papers above represent the first of the series. In each case a short prefatory note is included, explaining the objects of the investigation—a useful feature. The idea of first publishing definitions of terms used in subsequent papers is a natural one. It is well that those dealing with illumination should be put on record, as some of these terms are somewhat loosely used, even by those vocationally concerned with illumination. The addition of definitions of terms used in connection with vision is, however, a new step. It is rarely that these have accompanied treatment of illumination and their juxtaposition should be helpful to those interested in researches in which lighting experts and physiologists are equally concerned.

Technical Paper No. 2 is useful in showing that the amount of light absorbed by commercial window glass is much greater than is commonly appreciated. Values depend on the inclination of the light, and vary according to whether the rays are direct or diffused. Values range from 62 to 84 per cent. according to the conditions of test. Prismatic glass comes out well, as the absorption is not very much greater than that of plate glass, while the advantages as regards improved distribution of light are often considerable. It is interesting to observe that the method of having the smooth surface facing the light, with the ribbed surface inside, is frequently favourable to maximum transmission, besides enabling the external surface to be more readily kept clean.

Technical Paper No. 3, which amplifies the data already published in the B.E.S.A. specification for industrial lighting reflectors, is of special interest to electrical engineers. It is concerned mainly with the effect of the angle of cut-off on performance. Diagrams illustrating the influence of this angle on efficiency and distribution of light are presented. It is of interest to note that the luminous efficiency falls off at nearly the same rate for all the reflectors studied, namely, a decrease of from 1 to 1.5 per cent. for each increase of 1 deg. in the angle of cut off. The distribution ratio is more affected, the variation being as high as 50-60 per cent. in certain cases—an indication to the contractor and the consumer of how greatly illumination may be affected by inserting lamps in types of reflectors for which they were not intended. Under the conditions studied the extreme variations in the luminous efficiencies of reflectors are from about 50 to 80 per cent. Under normal conditions, with a reasonable angle of cut-off an efficiency approaching 70 per cent. may apparently be expected. There can be no question that the small sacrifice in efficiency involved in having a suitable angle of cut-off, and thus reducing glare, is well worth while. Yet another point brought out by these researches is the effect of variation in the shape of the filament. The ring filament in general leads to greater efficiency than the "festoon" shape, the difference in efficiency in certain cases being as high as 5 per cent.

The researches described in these papers have evidently been made with great care, and it is useful to have the results of impartial and authoritative tests on these somewhat complex problems. Further papers dealing with other researches of the Committee will be awaited with interest.

Alternating-Current Rectification. By L. B. W. Jolley, M.A., M.I.E.E. Second Edition. Pp. xxii+472; figs. 340. London: Chapman & Hall. 1926. Price 30s. net.

The second edition of this valuable work will be found to have been considerably enlarged, owing to the incorporation of a considerable amount of new matter, the necessity for this being indicative of the rapid advances which have recently been made in the development of rectifying apparatus. The preliminary mathematical chapter on the analysis of rectified wave forms has been amplified, and additional notes are given on analytical methods of resolving complicated wave forms. In the chapter on commutator rectifiers, the principles and construction of the transverter have been considered at some length, and a description of a small commutator rectifier is included. The chapter on thermionic rectifiers has been considerably expanded, and some interesting matter has been added, relating to the difficulties attending the design of large rectifiers of this class, in which the filament current exceeds 50 amperes. One of the principal of these difficulties is that of unequal filament temperature, owing to the superposition of the emission current on the heating current. The effect of this is usually to give a higher temperature at the negative end of the filament, and means have to be contrived whereby the polarity of the filament is periodically reversed. When the filament is supplied from a source of a.c. this reversal is conveniently effected by arranging for the frequency of the filament supply to be slightly different from that of the current to be rectified. For 50-cycle work a difference of five cycles has been found effective, this giving a reversal of the polarity of the filament with respect to the current rectified, five times a second. This rate of reversal is sufficient to maintain an approximately constant temperature throughout the whole length of the filament. A new chapter has been added on the installation of thermionic rectifiers, in which is an interesting note on a method of producing a rectified direct-current free from ripples, by the use of a special wave form on the a.c. side. Another new chapter deals with methods of obtaining small supplies for filament and anode circuits in small wireless sets, and a third additional chapter gives a brief account of recent work carried out in connection with the problem of converting direct to alternating current by means of apparatus using thermionic valves.

The amount of work carried out by Mr. Jolley in the revision and amplification of this book must have been very considerable. He will, undoubtedly, have maintained or even enhanced the reputation of his masterly work, which will remain the standard treatise on the subject of alternating current rectification.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Campaign Notes, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.

The E.D.A.-E.L.M.A. Campaign.

The official report for the week ended February 26th states that demonstration houses were opened at Derby, St. Albans, Portsmouth, and Cardiff. The last has been organised by the Ward Electric Co., and the front is a replica of the prize house. A demonstration house was to be opened at Bradford on Tuesday last, and one was to be inaugurated at Taunton yesterday (Thursday). The Derby house has been well attended, and the electrical contractors are very satisfied with the business results. A successful exhibition was opened at Halesowen on February 15th, and it is being visited by large numbers. During the current month, which is the last of the campaign, houses are to be opened at Chesterfield, Leicester, the Potteries, Birmingham, Dudley and Tamworth. The demonstration house at Sheffield has been so successful that the local circle has decided to keep it open until to-morrow (Saturday). A large increase in the demand for the competition booklet is reported, and ballot forms are reaching headquarters at the rate of over a thousand a day. During the current week the large working model of the prize house is on view at the St. Albans branch of the North Metropolitan Electric Power Supply Co.; the exhibition of the model in the showrooms of the Manchester Electricity Department led to inquiries from a large number of visitors. The North-East Coast children's competition evoked great interest and a high standard was reached in the painting competition.

The all-electric house organised by the Exeter and District Circle closed on February 19th. During the fortnight's run over 15,000 people visited the house. Special arrangements were made with the Exeter Education Committee for the purpose of demonstrating the wonders of electricity to school children. On February 24th, at a meeting of the executive committee of the Circle, the chairman (Mr. Arthur Force) presented Mr. Farthing, the G.E.C. demonstrator, with a silver cigarette case, and Mrs. Petersen, another demonstrator, with a gold wristlet watch.

At Glasgow, on Monday last, Mrs. David Mason, wife of the Lord Provost, formally opened the third all-electric house demonstration. Twenty thousand people have visited the second house at Shawlands. The latest demonstration house is a large self-contained dwelling at Hyndland, which has been specially fitted with every kind of modern electrical domestic appliance.

Aberdeen's all-electric house was opened to the public on February 22nd, and has since been visited by large numbers. The exhibition, which is to continue until March 12th, is under the auspices of the local circle comprising the Corporation Electricity Department, and electrical manufacturers, wholesalers, and contractors. Before the opening ceremony, Mr. J. A. Bell, city electrical engineer, gave a short address on the progress of electricity in Aberdeen. Recently, he said, the contractors and the Town Council had come to an arrangement whereby houses could be wired on the hire-purchase system, a method which allowed them to wire a class of house to which they would never have obtained access without that aid. That scheme had not been running a year yet, but already a sum of £4,000 had been spent in wiring houses on this basis.

Councillor Duncan, convener of the Electricity Department, also addressed the assembly. Tea was afterwards served, and on behalf of the local committee, Mr. A. McRobb presented Mr. Duncan with an electric kettle.

Trade Facilities Guarantees.

A further list of guarantees made by the Government under the Trade Facilities Acts was published recently. These guarantees, which bring the total amount to £70,721,780, include the following:—Ross-shire Electric Supply Co., Ltd. (extension of supply), £20,000; and £1,200,000 for the purchase of electrical equipment in Great Britain for a Hungarian electrical scheme. In the House of Commons on February 15th, Mr. Churchill informed Sir F. Wise that the Government had had to implement its guarantees under the Act in only five cases, involving a total amount of £34,837.

New Italian Company.

Among the companies lately formed in Italy is the Società Telefonica Elettrica Ligure-Lombarda, Milan, with a capital of 100,000 lire.

The Honduras Radio Market.

Reports indicate that the Honduras market for radio supplies, although still restricted, is becoming more important. The receipt of a British-made set has attracted much attention, supplies hitherto having come almost exclusively from the United States. The principal market for sets and components is in Tegucigalpa, the capital, with an appreciable English-speaking population. Few natives as yet own sets, but it is thought that, with well-organised propaganda, considerable progress in this direction might be made—*Reuter's Trade Service* (Tegucigalpa).

Anglo-French Industrial Conference.

The Federation of British Industries has arranged a conference with a number of leading French industrialists to take place on March 7th and 8th. The delegates from France will include M. Hecker, managing director of the French Thomson-Houston Co., and M. Dalbouze, president of the Syndicate of Machinery Manufacturers, Boilermakers and Founders of France. The principal matters down for discussion are:—The economic and fiscal treatment of nationals and companies of one country admitted to settle in the territory of the other; Customs nomenclature and classification; the organisation of production, including in particular international agreements, considered from the point of view of production, of the customer, and of labour, their legal position, and their connection with the Customs problems; the importance of the collection and prompt exchange of statistical information with regard to industrial production; and the limitation of trade fairs and exhibitions.

Hungarian Electrical Exports.

The *Board of Trade Journal* reports that during 1926 Hungary exported electrical machines and apparatus valued at 15,613,000 gold crowns, as compared with 13,982,000 cr. in 1925.

America and the British Market.

In a recent issue of *Commerce Reports*, the Electricity (Supply) Act, 1926, was reviewed at some length, and after stating that this Act and the current E.D.A.-E.L.M.A. Campaign should result in a greatly increased demand for electrical apparatus of all kinds, our contemporary says:—"It would be well for American manufacturers to strengthen or renew their operations in the United Kingdom, as, with the passage of this Act, there should be greater opportunity for the sale of electrical machinery and apparatus to industrial establishments, as well as to the homes. American firms considering competing in this market would do well to carefully analyse the conditions in the United Kingdom to find out the best methods on which to base their business. Considering the potential market for electrical apparatus in general, the future looks unusually bright for the sale of American material to the United Kingdom. If the 7,000,000 homes located in the areas of the present electricity supply undertakings were to be wired, this would in itself mean an expenditure of at least $560,000,000, a large percentage of which should be spent in trade with the United States."

New Municipal Showrooms and Offices.

The Sheffield Electricity Supply Committee has recommended to the City Council that the old telephone exchange be purchased, at a cost of £16,500, for conversion into additional showrooms, offices and stores for the Electricity Department.

German Cable Industry.

The booking of orders for lighting and power cables at the present time is said to be of small extent in accordance with the season, the works being but little employed on this branch. An increase in the orders is expected at the end of April, when the laying of cables will be resumed. The foreign trade is stated not to have undergone any change.

Another Polyglot Pamphlet.

In a recent issue we made mention of a booklet in 16 languages produced by the Brownie Wireless Co. We have now received from Mr. A. Hinderlich, 1, Lechmere Road, N.W.2, a folder dealing with piezo-electric quartz crystals in nine European languages.

Defective Railway Material in South Africa.

The Johannesburg correspondent of the *Financial News* says that, following close on the disclosure that 13 American locomotives recently purchased were already ineffective, the *Sunday Times* announces that rails to the value of a quarter of a million pounds sterling purchased on the Continent and intended for railway replacements have been condemned. The rails were apparently passed by the oversea official, whereupon the purchase price was paid on their arrival at Cape Town. However, when the rails had been examined by engineers, they were found to be showing cracked treads, and the lot condemned as useless are now hidden in the Cape Town railway yards. The South African railways are slowly and expensively learning that British goods are best.

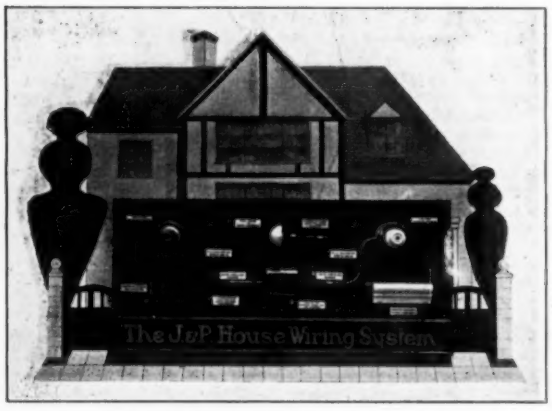
Local Exhibitions.

Carmarthen.—Mr. A. Preston, engineer and manager of the Carmarthen Electric Supply Co., Ltd., informs us that his company intends to hold a domestic electrical exhibition from March 28th to April 2nd, and he will be pleased to hear from manufacturers and factors who wish to take part. He states that this will be the first exhibition of its kind to be held at Carmarthen, and the furthest west in the country.

Newark.—In connection with the recently-inaugurated electricity undertaking (engineer: Mr. R. W. Willis), an exhibition is being held at the Town Hall from March 7th to 12th.

The "J. & P." Wiring System.

The accompanying illustration depicts an attractive display prepared for electricity suppliers and contractors by Messrs. Johnson & Phillips, Ltd. It comprises a three-ply board measuring 4 ft. 4 in. by 3 ft. 2 in., taking the form of a flat model of a house in bright colours. On the central board are



A "J. & P." Wiring System Display.

fixed examples of the essential features of the "J. & P." wiring system. The company has also issued an illustrated booklet relating the story of "John Green's" conversion to electricity *via* the "J. & P." system. This is arranged for overprinting—the example received bearing the name of the Barnsley Corporation Electricity Department.

Trade Announcements.

Messrs. J. H. Winter & Co., electrical engineers, of Bristol, have removed their business temporarily to Merchant Street, owing to the rebuilding of their premises in Narrow Wine Street.

The Cressall Manufacturing Co. has removed to 31 and 32, Tower Street, Birmingham.

Messrs. E. H. Hunter & Co. have removed to 68, Victoria Street, London, S.W.1.

Premier Cooler and Engineering Co., Ltd., has removed to 429, Strand, W.C.2. Telephone: Gerrard 6161.

Henrion Carbons, Ltd., has removed to Kinnaird House, 1, Pall Mall East, S.W.1. Telephone No.: Regent 3484. Telegraphic address: "Carboneros, London."

Messrs. Drake & Gorham, Ltd., have opened premises at Old Bank House, 105, High Street, Winchester.

New showroom premises have been opened by the Lichfield Agricultural Co., Ltd., Market Street, Lichfield, for the electrical department of the business.

Messrs. J. T. Bowles & Son, of 2a, York Street, Ramsgate, have taken over the management of the wireless business at the Southern Stores, 100, High Street.

Northern Steel & Hardware Co., Ltd., has removed to 1 and 3, Southgate, Manchester. Telephone: Central 4078 & 9. Telegrams: "Assiduous, Manchester."

Frigidaire, Ltd., has opened showrooms at 14, Waterloo Street, Glasgow, and 13, North St. Andrew Street, Edinburgh.

The Alton Battery Co., Ltd., has appointed the Robinson and Hands Electrical Co., Ltd., Barwick Street, Birmingham, as its Midland agents, and Messrs. Paterson & Service, 38, Bath Street, Glasgow, as its agents for Northern Scotland.

New Catalogues and Lists.

Messrs. J. Macgregor & Co., 3 and 5, Mansion House Chambers, Queen Victoria Street, London, E.C.4.—Folder giving prices of "Ferrowatt" lamps.

Messrs. Bronze Agencies, Ltd., 125, Mansion House Chambers, London, E.C.4.—List describing and illustrating in colour the "Lumina" electrically-illuminated fountains.

Mr. O. N. Beck, 11, Queen Victoria Street, London, E.C.4.—Circular describing the "Safegrip" patent drill protector.

Mr. J. S. Plumtree, 90-91, High Holborn, London, W.C.1.—Price list of cables, flexible cords and wires.

The Electrical Equipment and Carbon Co., Ltd., 109-111, New Oxford Street, London, W.C.1.—Three new priced leaflets describing respectively: V.I.R. and lead-covered cables, the "Mego-meter" insulation testing set, and "Elin" bell transformers, transformer bells and buzzers.

Foolproof Patent Accumulator Co., Ltd., Kettering Road, Market Harborough.—List of "L"-type Lion lighting batteries, with ebonite "lattice" separators, giving dimensions, &c., unpriced. Agent for S.E. and Home Counties, Mr. St. J. Shepherd, Eastwoodbury, Southend.

Messrs. Watson & Sons (Electro-Medical), Ltd., Sunic House, 43, Parker Street, W.C.2.—"Artificial Sunlight," 1927 edition, explaining the therapeutic applications of ultra-violet rays and the apparatus employed, with particulars and prices.

Messrs. Donovan & Co., Cornwall Street, Birmingham.—List No. 1,127, a comprehensive catalogue of electrical accessories, including switches, plugs and sockets, lampholders, conduit fittings, lighting fittings, fuseboards, domestic appliances, &c. Fully priced.

Automatic & Electric Furnaces, Ltd., 173-175, Farringdon Road, E.C.1.—Catalogue Section H, dealing with "Wild-Barfield" small electric furnaces for laboratories and works.

Power Contracts, Ltd., 138 and 140, Southwark Street, S.E.1.—A net trade price list of a.c. and d.c. guaranteed motors and a pamphlet dealing with reductions in the prices of "Batwin" motors.

Messrs. Cecil Hodges & Co., Ltd.—Folders Nos. 127 and 128 illustrating and describing the "Empire" patent power pump.

Unique Patents, 388, City Road, E.C.1.—A pamphlet describing the "Unique" shade carrier and lampholder. Illustrated and priced.

Messrs. Pickerings, Ltd., Globe Elevator Works, Stockton-on-Tees.—A well-illustrated brochure describing the company's electric passenger and goods lifts.

The Lea Recorder Co., Ltd., 28, Deansgate, Manchester.—Booklet M.L. illustrating and describing a number of applications of Lea recorders in power stations, &c.

The British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.—An attractive cardboard cut-out advertising "B.T.-H." radio valves.

Mullard Wireless Service Co., Ltd., Denmark Street, London, W.C.2.—A "quick guide" for P.M. valves in different circuits, their operating characteristics, and a replacement chart (cardboard, 12 in. by 8 in.) which should be very useful for the trader.

Bankruptcy Proceedings.

J. G. Sandell, 20, Hart Road, and Ansell Road, Dorking, electrical contractor.—The first meeting of creditors was held recently at 29, Russell Square, W.C.1. The statement of affairs showed liabilities of £590, against assets of £79, leaving a deficiency of £511. Debtor attributed his failure to being unable to recover debts due to him and law costs incurred in that connection. In April, 1922, with £60 capital, he commenced business on his own account as an electrical engineer and contractor. The business was successful, and early in 1924 he removed to larger premises. In September, 1925, he obtained a contract for an electrical and central heating installation at a kinema in Dorking for £652. The contract was completed, but he was unable to obtain payment of a balance of £369 owing in connection with it, and debtor said that that loss was the cause of his difficulties. The case being a summary one was left with the Official Receiver as trustee of the estate. The following are creditors:—

	£		£
British Thomson-Houston Co., Ltd.	30	National Radiator Co., Ltd.	70
Curtis, P., Ltd.	25	Sufra Electrical	25
D.P. Battery Co., Ltd.	25	Thomas, F., & Co. ...	40
Dorking Electric Supply, Ltd.	25	Walworth-Munzing, Ltd.	40
General Electric Co., Ltd.	25	Wholesale Fittings Co., Ltd.	35
General Cable Co., Ltd.	60	Walsall Hardware Co., Ltd.	25

Comton Wireless Manufacturing Co. (Alexander Pacy Pacifico, Jack Pacy Pacifico, and Raphael Feitelson, trading as), lately carrying on business at 25-26, Bartholomew Square, Old Street, London, E.C.—The failure of this firm occurred in June, 1926, and on February 22nd an application for an order of discharge was made on behalf of the bankrupt Alexander Pacy Pacifico. The Official Receiver reported that the provable debts of the firm amounted to £2,252, whilst the assets, valued at £1,830, had realised

only £382, owing chiefly to the fact that the stock-in-trade, purchased for £1,250, had yielded only £275. A dividend of 1s. 6d. in the £ had been paid. The bankrupt gave up his business of a fancy goods importer to join the above partnership in March, 1924; they traded successfully until February, 1926, when the business was adversely affected as a result of the general slump, and it was subsequently carried on at a loss. In March, 1926, with the object of obtaining additional capital with which to tide over the slump period and to develop the export side of the business, which was commenced in September, 1925, they endeavoured to obtain £3,000 in the form of investments in the business, but owing to the general strike intended investors withdrew before the negotiations could be completed. In June, 1926, judgment creditors levied execution on the stock and effects, and the business came to an end. The application was opposed by the Official Receiver upon statutory grounds, including unjustifiable extravagance in living and giving undue preference to a creditor. His Honour upheld the report of the Official Receiver, and granted a discharge subject to a judgment for £5 to be satisfied by an immediate cash payment.

E. W. Kirk, lately trading as the Ace Radio Manufacturing Co., 26, Curzon Street, Derby, wireless apparatus maker.—The first meeting of creditors was held on February 24th at the Official Receiver's offices, Nottingham. The statement of affairs showed gross liabilities of £290, of which £285 was expected to rank, and there was a deficiency of £269. Debtor attributed his failure to bad trade accentuated by the coal dispute, to the fact that bigger makers were undercutting, costs on writs, &c. It appeared that he patented a special coil and in October, 1924, with £50 capital in cash and materials, he commenced business on his own account to work the patent. The business was successful at first, but subsequently, owing to a reduction in prices, he was unable to compete. In June, 1926, he sold the patent for £75. Creditors pressed, and several judgments were obtained, and he filed his petition. The matter was left with the Official Receiver as trustee.

C. J. Nichols (C. J. Nichols & Co.), electrical engineer, 7, Park Street, Bridgend.—Last day for proofs for dividend, March 11th. Trustee, Mr. G. G. Poppleton, 26, Corporation Street, Birmingham.

S. T. Hosken, wireless accessories manufacturer and factor, 153, Fleet Street, E.C.—Bankrupt's discharge suspended until January 28th, 1928.

J. E. W. Archer, wireless dealer, &c., late of 259, Crookes, Sheffield.—Last day for proofs for dividend, March 14th. Trustee, Mr. L. J. Clegg, Official Receiver's offices, 14, Figtree Lane, Sheffield.

A. H. Richardson (Radio Supplies), wireless manufacturer, 4, Rose Hill, and Wellingborough Road, Finedon, Northampton.—Receiving order made February 18th on debtor's own petition.

J. Humphreys, plumber and electrical engineer, 1, Yard Behind the Plough Inn, Oldham Road, Rochdale.—Trustee, Mr. J. G. Gibson, Official Receiver, Byrom Street, Manchester, released February 17th.

J. R. Charnock, cycle dealer and electrical engineer, Meanwood Road, Meanwood, Leeds.—First and final dividend of 17s. 3d. in the £ payable March 17th at the Official Receiver's office, 24, Lower Bond Street, Leeds.

G. W. Tempest (Northern Radio Co. and the General Wireless Trading Co.), radio and telephone engineer, 12, Sandhurst Road, Stockport, 40, Brazennose Street, and Arcade Chambers, Manchester, and Commercial Street, Leeds.—First and final dividend of 11d. in the £ payable at 27, Brazennose Street, Manchester.

Company Liquidations.

J. P. Castle & Co., Ltd., 72, Shoe Lane, London, E.C., electrical engineers, &c.—A meeting of creditors was held on February 23rd at 50, Gresham Street, E.C., when a statement of affairs was presented, which showed liabilities of £573. The net assets were £87, and the deficiency was £48£. It was reported that the company was registered at the beginning of last year with a nominal capital of £2,000, of which £1,512 had been issued and was fully paid. The vendor was allotted shares of the face value of £1,000, fully paid, whilst shares for £512 were issued for cash. No trading figures had been prepared, but the turnover had probably been about £100 a month. The meeting appointed the principal creditors to act as a committee in conjunction with the liquidator. The following are creditors:—

	£		£
Baxter & Caunter, Ltd.	179	Crane, Bennett & Co. ...	26
Blair, J. F.	20	Girling, L.	70
Chloride Electrical Storage Co., Ltd.	54	Wright, William, & Co.	53

Claremont, Johnson & Co., Ltd., electrical and wireless factors, 4, Union Place, Wells Street, Oxford Street, W.1.—A meeting of the creditors of this company was held on February 28th, at Winchester Street, E.C. The chair was occupied by Mr. W. J. Hodge, one of the joint liquidators. The statement of affairs presented disclosed liabilities of £4,808, and assets, after allowing £214 for preferential claims and £2,545 for loans on debentures, of £4,627, leaving a deficiency of £181. The assets included stock-in-trade £2,650, and good book debts £3,275. Mr. Hodge stated that the company was formed in July, 1923, with a nominal capital of £4,000, to acquire a business formerly carried on under the style of Claremont, Johnson & Co., and to carry on the business of importers and manufacturers of electrical apparatus, the consideration being £906, satisfied by the issue of fully paid £1 shares. The capital had been increased from time to time and the paid-up capital to date was £2,606. There were 1,500 shares, on which 10s. each remained unpaid, but £200 had been paid in advance in respect of them, leaving the unpaid calls to date £550. For the year to March, 1923, the turnover had been £14,903, and there was a net profit of £491. In the following year the turnover was £25,125, and there was a profit of £414. For the year to March, 1925, the turnover was £43,872, and there was a profit of £1,074. In the following year the turnover was £30,976, and there was a loss of £1,373. The liquidator stated that the debenture holder was Mr. David Cohen, whilst he (the chairman) had been appointed receiver on his behalf. He was also a director of the company. When the company took over it agreed to pay the liabilities then existing. The liabilities in the balance sheet of March, 1926, were £7,357. The assets were approximately £9,000. The debentures were created on October 22nd, 1925. An interim statement got out at that time showed a loss of about £500 or £600. A Leeds branch of the business was started just prior to the coal dispute, and that was being continued by the receiver, as was the London business, with a view to a sale as a going concern. The liquidator had had no definite offer at the present time. Mr. Hodge intimated his willingness to resign in favour of Mr. E. H. Hawkins, of Messrs. Poppleton, Appleby & Hawkins, 4, Charterhouse Square, E.C., who was appointed joint liquidator, with a committee of five of the principal creditors.

With reference to the above matter, The Castellina Co. (1926), Ltd., of 52, Great Marlborough Street, London, W., has written to us under date February 28th, as follows:—"It appears that many people in the trade are under the apprehension that The Castellina Co. (1926), Ltd., is connected with the firm of Claremont, Johnson & Co., Ltd., now in liquidation. May I point out that the two companies were actually competitors. Although Mr. Claremont and myself were originally directors of Claremont, Johnson & Co., Ltd., neither of us has taken any management in the latter since we left its employ some considerable time ago.—G. W. Johnson, Managing Director."

Orlings Telegraph Instruments Syndicate, Ltd.—Winding up voluntarily. Liquidator, Mr. H. Hagon, 15, Grosvenor Mansions, 82, Victoria Street, S.W. A meeting of creditors was held at the liquidator's offices on March 3rd.

St. Helens Electric Lighting Co., Ltd.—A meeting of members is called for March 25th at Broad Sanctuary Chambers, Tothill Street, S.W., to hear an account of the winding up from the liquidator, Mr. C. H. Jones.

Presland Electric Supplies, Ltd.—A meeting of members is called for March 28th at 84, Eden Street, Kingston-on-Thames, to hear an account of the winding up from the liquidator, Mr. W. Bronson.

Neutron, Ltd.—The first meetings of creditors and contributories were held on March 3rd at Carey Street, W.C.

Dissolution of Partnership.

Glaisher & Dives, dealers in photographic and wireless supplies, 14, George Street, Croydon.—Mr. W. R. Glaisher and Mr. F. V. Dives have dissolved partnership. Mr. Glaisher will attend to debts and continue the business.

Our Electrical Machinery Markets.

With the January trade returns, the Board of Trade resumed the practice of giving details of the destination of electrical machinery exported from this country. The following table shows the distribution of this machinery, and the figures for January, 1926, are also given, with a note of increases or decreases:—

Destination.	Jan., 1926. £	Jan., 1927. £	Inc. or dec. £
European countries	48,757	71,691	+ 22,934
Japan	18,042	36,293	+ 18,251
South America ...	55,501	31,147	− 24,354
South Africa ...	47,893	148,393	+100,501
British India ...	102,131	126,451	+ 24,320
Australia	85,738	66,667	− 19,071
New Zealand ...	32,703	52,603	+ 19,900
Canada	8,730	17,510	+ 8,780
Other countries ...	74,076	62,568	− 11,508
Totals ...	£473,570	£613,323	+£139,753

The Census of Production.

A preliminary report upon the results of the third Census of Production appeared in last week's *Board of Trade Journal*. These deal with the iron and steel trades, and interesting details are given of production in 1907 and 1924, employment, the use of power, &c. The report is the first of a series which, are, presumably, to be published as supplements to the *Journal*.

Prices of Raw Materials.

Reporting on February 26th, Messrs. James Forster & Co. state: "Closing prices of lead yesterday were £28 2s. 6d. for February, and £28 10s. for May, a rise on the week of 10s. per ton. . . . The prospect is for continued firm markets, accompanied by a larger consumption of lead, and a probable small decrease in supplies."

Messrs. F. Smith & Co. report, March 1st: Copper (electrolytic) bars, £63 5s., 55s. inc.; ditto ditto sheets, no change; ditto ditto wire rods, £73 5s., 30s. dec.; ditto ditto h.c. wire, 9¼d., ¼d. inc.; silicium bronze wire, 10¾d., ¼d. dec.

Messrs. James & Shakespeare report, March 1st: No change in the prices for copper bars (best selected), sheet and rod; English pig lead, £30, 10s. inc.

Messrs. Edward Till & Co. report, March 1st: India-rubber, Para fine, 1s. 4¼d., ¾d. inc.

Big Cable Company Deal.

Mr. W. Emlen Roosevelt, chairman of the board of directors of All-America Cables, Inc., and Mr. S. Behn, president of the International Telephone and Telegraph Corporation, made the following announcement after the meetings of their respective boards held on February 23rd:—The International Telephone and Telegraph Corporation has authorised an offer to issue its stock in exchange for All-America stock at the rate of four shares of International stock for three shares of All-America stock, and the board of All-America Cables, Inc., has recommended the acceptance of the offer. The offer contemplates that the All-America stock shall be deposited with a committee nominated by the board of All-America Cables, under a deposit agreement authorising the transfer of the deposited stock to the International Co., when, in order, depositors are to receive certificates of deposit. Messrs. J. P. Morgan & Co. are to be the depositaries of the committee, and the certificates will be registered by the Central Union Trust Co. Further details of the offer will be communicated in a circular presently to be issued by each of the corporations to its stockholders. The consummation of the transaction will require a deposit under the agreement of an amount of stock deemed sufficient by the International for its purposes. It is stated that the successful operations heretofore of each of these corporations in the field of electrical communications will be materially furthered by the affiliation above proposed. The present members of the board of All-America Cables have been requested to continue as such, and certain of these directors will be elected to the board of the International Co. Mr. Merrill, as president, and the other officers and staff of All-America Cables, are to continue in its management. Representatives of the International Co. will be elected to the board of All-America Cables in due course.

Deed of Assignment.

J. B. BRABY, electrical engineer, 67, Maybury Road, Woking.—Particulars of claims by March 22nd to Mr. W. A. J. Osborne, trustee, Balfour House, Finsbury Pavement, E.C.

Australian Tariff Decisions.

The duties on certain electrical appliances have recently been decided by the Australian Tariff Commissioners as follows:—Static oil-immersed condensers: free under the British preferential tariff; 5 per cent. under the intermediate tariff; and 10 per cent. under the general tariff. Similar rates apply to electrically-driven human hair-clipping machines, automatic voltage regulators, and auto-synchronous electric motors. Electrically-heated cotton, wool, &c., testing ovens and auto-valve lightning arresters are admitted free of duty under all three tariffs.

Book Notices.

Scientific Papers of the U.S.A. Bureau of Standards, No. 542, "Electric Field of a Charged Wire and a Slotted Cylindrical Conductor" (10 cents).

"The Age of the Earth," by A. Holmes. Pp. 79. Price 6d.; "Modern Scientific Ideas," by Sir Oliver Lodge, F.R.S. Pp. 79. Price 6d. London: Ernest Benn, Ltd.

"Science Abstracts" (A and B). Vol. XXX. Part 2. February 25th, 1927. London: E. & F. N. Spon, Ltd. Price 3s. each.

"Electric Locomotives," by R. H. Wright. Pp. 32; illustrated. London: Association of Engineering and Shipbuilding Draughtsmen. Price 2s.

"Sell's Registered Telegraphic Addresses for 1927." London: Business Dictionaries, Ltd. Price 45s.—This Directory for 1927 is published in a new form so that it can be more easily handled, a broader page has been used and several new features have been incorporated. Chief among the improvements is a system of reference by which the telegraphic address of any firm can at once be found or, *vice versa*, the firm owning any known telegraphic address. Each name has been given a code number, so that in the text of a telegram or cable it may be referred to by number, while the indexing system enables the user instantly to find the number of any firm, or the firm represented by any known number. The classified trade list of 130,000 names and addresses has been rearranged and made more complete, and forms a comprehensive guide to the chief firms in every branch of business throughout Great Britain and Ireland.

"Waterworks Pumping Plant" is the title of a brochure issued by Messrs. Mather & Platt, Ltd., Manchester, dealing with some interesting schemes in various parts of the world where centrifugal pumps are employed. Naturally, electric driving is often adopted for this purpose, but steam turbines and oil engines are sometimes used, and examples of all these are found in this well-illustrated publication, working under a variety of conditions.

"Atomic Theory," by A. Haas. Pp. xiv+222; figs. 56. London: Constable & Co., Ltd. Price 10s. 6d. net.

For Sale.

Burton-upon-Trent Electricity Department has for disposal one 2,000-kW Westinghouse high-pressure turbo-alternator, with surface condenser and auxiliaries. The South London Merchandise Mart will sell by auction on March 10th, at 10, Red Lion Passage, Red Lion Square, W.C., the stock of an electrical and wireless factor. (See our advertisement pages to-day.)

Recent Contracts.

MESSRS. STUART TURNER, LTD., Henley-on-Thames, have just delivered to the Post Office two generating sets for battery charging, the output being 2.28 kW. The engines are of the company's standard two-cylinder, 4-stroke type, direct coupled to "Bull" generators. The sets are fitted for running on gas, but stand-by petrol carburettors are also supplied. A 500-W set has also just passed tests by the Post Office engineers. This plant is identical with the standard "Stuart" country-house plant. These sets are additional to the contract for eighty 120-W sets now going through the works.

MESSRS. J. BLAKEBOROUGH & SONS, LTD., have received an order for equipment for controlling the water supply to four turbines, aggregating 126,000 h.p., which are being installed on the Sho River, Japan, by the Nippon Electric Power Co. The equipment comprises four "Larner-Johnson" valves, weighing over 50 tons each, to work under a head of 176 ft. They will be 11 ft. in diameter.

Among the orders which MESSRS. YARROW & CO., LTD., have in hand for their boilers are the following:—Three further h.p. boilers for the Barking station of the County of London Electric Supply Co., Ltd.; three boilers for the Portsmouth Dockyard power station; and four for the City of London Electric Lighting Co., Ltd.

Social Events.

The Social and Athletic Club of Standard Telephones and Cables, Ltd., New Southgate, has recently held several successful functions. The first of these was a whist drive at the works canteen, about 140 being present. After whist, dancing took place to the accompaniment of the works band. The works "Black and White" concert party gave a show before 400 people at a later date; the items, serious and humorous, were greatly appreciated. On Friday last a dance was held at the Alexandra Palace, about 500 attending. A number of future events have been arranged.

Bermondsey Strike Settled.

The strike of workers in the Bermondsey electricity undertaking was settled on February 24th, the man who was the cause of the dispute being transferred to another department.

Unemployment.

Unemployment is still decreasing; during the week ended February 14th the number of unemployed fell by 33,290. The total at that date was 1,270,200, as compared with 1,303,490 on February 7th and with 1,139,228 on February 15th, 1926.

British Representative in Brazil.

It is announced by the Department of Overseas Trade that the address of the Commercial Secretary in Brazil (Mr. E. Hambloch) is now: Rica Municipal 4, Rio de Janeiro.

Lighting and Power Notes.

Asia Minor.—NEW POWER STATION.—The Société des Tramways Smyrne-Gueuztepe has commenced the construction of a new power plant at Daragatch. The plant will have an initial capacity of 5,000 h.p. and an ultimate capacity of 20,000 h.p. Electricity will be transmitted by underground cables from Daragatch to Bahri Baba, where it will be stepped down from 6,000 to 600 V.

Australia.—VICTORIA.—Plans for a new generating station at Richmond are now being prepared by the Victorian Electricity Commission, following authorisation from the Attorney-General at the end of last year. Examination of the Melbourne Electric Supply Co.'s equipment, it is stated, shows that the boiler plant is highly efficient, and in excellent order, and will be available for use in the new power station. The old generating machinery of the company, however, is only adapted for single-phase working, and is unsuitable. Tenders for the supply of the new generating machinery will be called for as soon as the new specifications are completed.

DEVONPORT (TASMANIA).—**The hydro-electric supply for the North-West was recently formally inaugurated by the State Governor at Devonport.** The general manager of the department reports that the State now generates approximately 60,000 h.p. The extension to the North-West has cost £154,000, and there are prospects of the paper pulp industry coming to Burnie at an early date, justifying a further extension. The system will be paying its way this year, and the revenue expected is £262,000. The department does not expect any profit from the north-western extension at present, but it is anticipated that the farmers will use it as they are doing in the midlands and south.

Aylesbury.—LOANS.—The Town Council has received sanction to a loan of £3,000 for domestic electrical apparatus to be let out on hire, and is to apply for sanction to a further loan of £15,406 for additional work required in connection with the rural electricity scheme.

Birmingham.—PRICE REDUCTIONS.—The charges for l.p. supplies of electricity are to be reduced by ½d. per kWh after the reading of meters for the March quarter.

Brightlingsea.—ELECTRICITY SUPPLY.—The Urban District Council has requested the Colchester Corporation Electricity Committee to meet it to discuss the question of an electricity supply for the town. The County of London Electric Supply Co., Ltd., which is seeking powers to supply electricity in bulk to authorised undertakers in the county, has suggested that the Council should apply for its own Order as distributor. Mr. W. T. Warren has informed the Council of his intention to apply for an Order to supply electricity to the town, and states that he is willing to give the Council the right to purchase his undertaking within the next two or three years, or at the end of 21 or 30 years.

Brighton.—LOANS.—The Electricity Committee has recommended that application be made for sanction to the following loans: £50,000 for mains and services; £2,000 for additional cooking and heating apparatus; £13,428 to cover excess expenditure on work at present being carried out.

Chesterfield.—LOANS SANCTIONED.—The Corporation has received sanction to the following loans: Mains and services, £55,311; hire-purchase wiring installations, £12,353; meters, &c., £11,174.

Continental.—ITALY.—A scheme is in hand for the construction of important hydro-electric works in the Val Borbera, which will supply energy for the electrified part of the State railway system. There will be two power stations known as the Persi and the Pian-della-Botte. At the Persi station three sets, of 9,000 kW each, will be installed. The plant at the Pian-della-Botte station will include three sets, each of 4,500 kW.—*Reuter's Trade Service* (Milan).

GERMANY.—The United Westphalian Electricity Works Company, of Dortmund, has been occupied for a year past in gradually adapting its four generating stations to the use of pulverised coal, and for this purpose the company a little time ago acquired the Alte Haase and Gottessegen collieries. In order to extend the coal basis, the company has now obtained the majority of the shares in the Kleine Windmuhle colliery.

FRANCE.—An arrangement has recently been concluded between the Société de l'Electricité de Caen, whose distribution system extends into part of the Department of Calvados, and the Société de Distribution d'Electricité de l'Ouest and the Société des Gaz et Eaux which supply electricity to the Departments of Orne and La Manche, under which the generation of the electricity required for the three Departments will be centralised at the new station which has recently been erected on the banks of the canal at Caen. The three concerns have been amalgamated under the title La Société de l'Union Electrique de l'Ouest, and orders have been placed for the installation of an additional 12,000-kW turbo generator at the power station.

SWITZERLAND.—As part of the scheme for the completion of the Barberine-Vernayaz hydro-electric power station, the Swiss Federal railway authorities have been engaged for some time past on the erection of a power transmission line between Vernayaz and Rapperswil, with connections to the substations at Puidoux and Kerzers for the supply of electricity for the electrified railways in West Switzerland. The line has for some time past been in operation as far as Puidoux, but energy is now being transmitted over the full length of the line, which is estimated to have cost about £760,000.

Dorking.—ELECTRICITY SUPPLY.—The Urban District Council has granted a further lease of the electricity Order to Messrs. Edmundson's Electricity Corporation, Ltd. The charge for lighting is to remain at 10d. per kWh, but the charge for heating and power is to be reduced from 6d. to 3d. per kWh.

Dover.—ELECTRICITY FROM BARKING.—It is reported that the Electricity Commissioners have intimated to the Town Council that an electricity supply for the town is to be obtained in bulk from the Barking power station, with another station at Richborough. The change will probably be made in the next three or four years.

Dundee.—ELECTRICITY EXTENSIONS.—The Corporation electrical engineer (Mr. D. H. Bishop) has reported that during last December the capacity of the rotary convertor plant supplying the central area was heavily taxed, and extensions were now necessary to meet the increasing demand for electricity. The erection of sub-stations at a cost of £25,470 is proposed. Sanction has been received to the borrowing of £250,000 for extensions.

Guildford.—NEW POWER STATION.—The foundation stone of the new Corporation power station was laid by the chairman of the Electricity Committee on February 28th. The estimated cost of the station is £140,000, and it is hoped that it will be completed in October next.

Hornsey.—EXTENSIONS.—The Electricity Committee is to lay additional feeder cables at a cost of £6,500, and to extend the plant at Highgate sub-station at a cost of £1,500.

Horsham.—YEAR'S WORKING.—The accounts of the Urban District Council's electricity undertaking (engineer: Mr. F. French) for the year ended March 31st last show a total revenue of £13,981, as compared with £12,716 in the preceding year. Working expenses increased from £6,678 to £7,661, leaving a gross profit of £6,321, as against £6,038. After deducting interest, capital expenditure charged to revenue, &c., there was a net surplus of £2,383, which was transferred to the district fund. The previous year's working resulted in a surplus of £1,622. The sales of electrical energy increased from 655,345 to 746,013 kWh, and the average price per kWh obtained fell from 4.35d. to 4.10d.

Huddersfield.—OPPOSITION TO BILL.—The Town Council is to oppose the Bill which is being promoted by the Yorkshire Electric Power Co.

NEW PLANT.—The Electricity Committee has received sanction to the extension of the generating station by the installation of one 5,000-kW, 3-phase, 50-cycle turbo-alternator.

Lancaster.—ELECTRICITY CHARGES.—The Electricity Committee has announced that it does not propose to make any increase in the charges for electricity to meet the higher cost of coal.

Liverpool.—CONTRIBUTIONS TO RATES.—The sum of £100,000 is to be allocated by the Tramways and Electric Power and Lighting Committee towards the relief of next year's rates. The quota from the Tramways Department is £75,000, and from the Electricity Department £25,000.

London.—ISLINGTON.—The Lighting Committee has recommended the withdrawal of the increase of 10 per cent., imposed during the coal dispute.

HACKNEY.—The Finance Committee has recommended that application be made for sanction to a loan of £15,000 for cooking and other domestic appliances to be let out on hire.

POPLAR.—The Electricity Committee has reported that the new generating station is nearing completion and will shortly be put into commission. As this is the first complete station of its kind to be erected in England, an opening ceremony is proposed, and Sir Andrew Duncan is to be invited to perform the ceremony. The Committee has received sanction to loans totalling £50,000 for electricity purposes.

Macclesfield.—APPOINTMENT OF CONSULTANTS.—The Electricity Committee has recommended to the Housing Committee that Messrs. Merz & McLellan be instructed to prepare a comprehensive report upon the present electricity supply to the town and their recommendations as to a scheme for the future development of such supply. It is understood that the report will take six weeks to prepare. The Housing Committee has approved the recommendation.

Manchester.—PROPOSED CHANGE-OVER.—The Corporation has given notice of its intention to apply for consent to alter the system and pressure of electricity supply from 3-wire d.c., 200 and 400 V, to a.c., single-phase, 230 V and 3-phase, 400 V.

Newbury.—OPPOSITION TO BILL.—The Town Council has decided to oppose the Bill of the Wessex Company on the grounds that it has power to purchase the undertaking of the Urban Electric Supply Co., Ltd., in 1943, and that in the Bill there is provision that the company will by agreement purchase the undertakings in its area.

Portland.—SPECIAL ORDER.—The Urban District Council has instructed its consulting engineers to take the necessary steps in conjunction with the Parliamentary agents to obtain a Special Order authorising it to supply electricity in the area.

Portsmouth.—ELECTRICITY CHARGES.—The Electricity Committee has recommended that the charges for electricity be reduced to those in force prior to the coal dispute.

EXTENSION OF SUPPLY.—The Farnham Rural Council has requested the Corporation to extend the mains to six parishes in its area.

Rhyl.—WIRING OF SMALL HOUSES.—According to the *Manchester Guardian*, with the rapid development of the district and the bulk supply of electricity to the Council's works from Dolgarrog, the Council has introduced a scheme for the "free" wiring of the smaller residences. Subject to the consent of the Electricity Commissioners, the Council will wire houses free of cost, and charge an extra 2d. per kWh for electricity consumed through prepayment meters until the amount received has covered the cost of the installation.

South Africa.—ELECTRICITY SUPPLY COMMISSION.—Arrangements have now been concluded between the Railways and Harbours Board and the Electricity Supply Commission whereby the latter body takes over as from January 15th last the generating station at Colenso, together with the transmission lines and automatic sub-stations at present supplying the railway between Glencoe and Pietermaritzburg, as well as a few of the principal towns along the route. Mr. T. P. E. Butt is the engineer to the Commission in charge of Northern Natal Section.

DURBAN.—The last addition to the municipal power station, comprising a Metropolitan-Vickers 5,000-kW set, and a Babcock & Wilcox 60,000-lb. boiler, has recently been put into service, and will meet the anticipated demand until the new Congella power station of the Electricity Commission is put into operation in 1928. The domestic load is increasing rapidly, and the recent six months' publicity campaign to popularise electric cooking and heating apparatus resulted in the installation during the six months of 632 cookers and 402 heaters.

Swansea.—PROPOSED NEW STATION.—It is stated that the Town Council, after discussing a report of the deputation which recently waited on the Electricity Commissioners for guidance as to the attitude the Commissioners may adopt with regard to the erection of a super-power station to replace the present electricity works, has decided, in view of the fact that a larger generating station will in any event have to be provided to meet the future demands, to exercise an option already obtained on a site at Morriston on which to erect the first section of a station. The cost of this section is estimated at £500,000.

Swinton and Pendlebury.—CHANGE-OVER.—The Urban District Council has decided to change over the electricity supply from the Bridge Street sub-station from d.c. to a.c. The approximate expenditure will be £69,000.

United States.—ELECTRICAL DEVELOPMENT.—According to *Power*, work on the installation of the first 100,000-kW set of the new Long Beach steam plant No. 3 of the Southern California Edison Co. is to begin at once. Present plans call for the eventual installation of eight such sets, which will bring the total capacity of the entire Long Beach steam plant to more than 937,500 kW. This first set is to be ready for operation February 1st, 1928, and is to cost, together with necessary transmission and distribution equipment, approximately $7,000,000.

The American Gas & Electric Co. announces the purchase for the Philo plant of the Ohio Power Co. of a steam generating set rated at 165,000 kW. The installation of this set, complete with boilers, coal-handling apparatus and h.p. transformers, calls for an expenditure of approximately $17,000,000, and will raise the capacity of the Philo plant to 245,000 kW. This station, with the Windsor, Twin Branch, Cabin Creek, Kenova, Glen Lyn and Logan plants, feeds one h.p. transmission system which extends from Michigan through Indiana, Ohio and West Virginia to southern Virginia and Tennessee on the south and the Ohio River on the east, and is interconnected with the Chicago, Toledo, Cleveland and Pittsburgh lines, making it one of the largest interconnected power systems in the world.

West Ham.—PROPOSED ELECTRICITY EXTENSIONS.—The borough electrical engineer (Mr. F. W. Purse) has submitted a report to the Electricity Committee on the future development of the electricity undertaking. He states that there is sufficient accommodation in the engine house for the installation of two turbo-alternators with a rated capacity of 16,000 kW and a maximum continuous overload of 20,000 kW, and in the boiler house four 100,000-lb. water-tube boilers could be installed. When this plant is fully loaded, and if a further supply from the power station is desirable, three of the sets at present installed could be replaced by plant of double the capacity, *viz.*, 50,000 kW instead of 25,000 kW, making a grand total of 110,000 kW installed capacity. The cost of the extension is estimated as follows:—Generating plant, £143,000; boilers and accessories, £120,000; cooling towers, £12,000; switchgear, £10,000; foundations, &c., £25,000; pipework, £10,000; total, £320,000. The scheme would be carried out in two stages, and the first set would be installed in time to meet the winter load in 1929, which it is expected will be 34,500 kW. The second section of the work would be put in hand three or four years later, depending upon the rate of increase in the load. The estimated cost of the first section is £160,000. The report has been adopted by the committee, and application is being made to the Electricity Commissioners for sanction to carry out the extensions. The London and Home Counties Joint Electricity Authority is being given notice of the application.

West Midlands.—ELECTRICITY SUPPLY.—The expenditure of £3,600,000 recently sanctioned by the West Midlands Joint Electricity Authority, is for the following purposes: Purchase of generating stations, £1,500,000; mains £400,000; sub-station switchgear, &c., £300,000; Ironbridge generating station, £1,250,000; Ocker Hill extension, £150,000.

Wirral.—INSTITUTION SUPPLY.—At a recent meeting of the Board of Guardians, it was decided to ask the president of the Liverpool Engineers' Society for advice as to whether it would be more beneficial for the Guardians to take a supply from the Birkenhead Corporation for their institutions or to generate electricity themselves.

Tramway and Railway Notes.

Continental.—HUNGARY.—The Budapest correspondent of *The Times* reports that a contract has been signed by the Hungarian Government and representatives of a group of English capitalists known as the Talbot group. This group proposes to erect a large electric power plant in Hungary, at Banhida, for the electrification of the railway, Budapest-Hegyeshalom, the Hungarian section of the Budapest-Vienna line. The same plant would supply the Hungarian capital and the towns in the territory between Budapest and Banhida with electricity. The capital is estimated at about 60,000,000 pengoes (£2,200,000), and is to be provided by the English group under the guarantee of the Trade Facilities Act. It is said that 40 per cent. of this capital must be spent in the English market for machinery and other material necessary for the erection of the plant.

SPAIN.—Work is shortly to be commenced on the electrification of the railway between Barcelona and San Juan de les Abadesas.

FRANCE.—A scheme to replace the tramway between Cannes and Grasse by a railless-car service is under consideration. The tramway track and rolling stock are worn out, and it is considered that it will be cheaper to adopt railless cars than to endeavour to renew the existing plant.

GERMANY.—Work is well in hand on the electrification of the last section of the railway between Laubau and Breslau, Silesia, a distance of about 130 miles. To meet the increased demand for electricity, the central station at Mittelsteine is being extended to a capacity of 24,000 kW. A sub-station is also to be established at Mettkau.

SWITZERLAND.—Plans have been prepared by the Berne Alpenbahn Co. for the electrification of the railway between Berne and Neuenberg. The cost of the work is estimated at approximately £272,000, half of which, it is suggested, should be furnished by the Swiss Government and the remaining half provided by the authorities of the Cantons of Berne, Neuenberg, and Freiberg.

CZECHO-SLOVAKIA.—A scheme is reported to be under consideration for the construction of an underground electric railway in Prague.

Halifax.—FARES REVISION.—The Tramways Committee has recommended considerable changes in the tramway fares, with special privileges for long-distance passengers. It is proposed that the 1½d. fare in the town should be increased to 2d., but that a maximum of 3d. be charged for distances beyond the 2d. stage. This means that the fare for the longest stage (from Hebden Bridge, a distance of 7½ miles) will be 3d. instead of 9d.

Telegraph and Telephone Notes.

Australia.—"BEAM" RADIO-TELEGRAPH TESTS.—We are informed by Marconi's Wireless Telegraph Co., Ltd., that in a statement telegraphed to London Amalgamated Wireless (Australasia), Ltd., announces that during the past three weeks the "beam" wireless station has been thoroughly readjusted and retested with very satisfactory results. During two days (February 23rd and 24th) beam signals from England were heard in Australia throughout the 24 hours, and two-way communication at speeds ranging from 250 to 3,000 letters per minute has been established daily for several hours on end, the maximum speeds being equal to those obtained on the relatively short-distance beam between England and Canada and higher than any other long-distance telegraph system operating to-day. During a continuous test of seven days the average traffic capacity exceeded 60,000 words per day in each direction, or approximately three times the minimum required in the latest agreement between the Commonwealth Government and Amalgamated Wireless (Australasia), Ltd. Communication tests are being continued, and negotiations are proceeding in relation to finalised traffic arrangements. As soon as these are completed and the British official tests are finalised the service will be opened for public traffic.

France.—INTERNATIONAL TELEPHONY.—Paris is already well linked with the rest of the Continent by telephone, but improvements will shortly be made which will greatly facilitate international communication, especially with Great Britain. At present 18 circuits link France with Britain, 15 exist between France and Belgium, and 2 between France and Holland; before the end of the year this number will be increased to 21, so far as Britain is concerned, and additional lines are to be laid to facilitate communication with Holland and Belgium. The new Paris-Boulogne-London cable, which is to be completed before the end of the year, will permit of 100 simultaneous telephone communications between the two capitals. Additional lines are being constructed between Paris and Turin, Bale, Zurich, Berne, Geneva, Frankfort, Berlin, Lausanne, Mayence, Cologne, Hamburg, Prague, and Vienna.

The opening up of the new Paris-Milan circuit will permit of telephone communication between Paris and Venice. The Paris-Mulhouse cable has just been linked with the Swiss system, and will shortly also be connected with the German system at Appenweier (Grand Duchy of Baden). A system of relays will shortly enable Paris to communicate with Stockholm and Copenhagen *via* Berlin, and with Budapest *via* Frankfort and Vienna.—*Reuter* (Paris).

Greece.—TELEPHONE SERVICE.—It is announced that the Siemens and Halske Company has acquired 80 per cent. of the capital of the Greek Telephone Company, the former's investment being stated to amount to 10,000,000 marks. The so-called German telephone system is to be introduced into Greece.

Spain.—RADIO-TELEPHONY.—The newspapers report that the Government will shortly sign an agreement with the Argentine Radio Company for the establishment of direct wireless communication between Madrid and Buenos Aires by means of the station at Madrilene, Prado del Rey, which is one of the most powerful in existence. The service will probably be opened in six months' time, and later direct wireless telephone and radio-photographic communication will be established. Experiments which have already been made are stated to have been very successful.—*Reuter* (Madrid).

The Telephone Service.—GLOUCESTER AUTOMATIC EXCHANGE.—Gloucester City's telephone system has been changed from manual to automatic operation. The automatic equipment, together with the associated manual switchboard still necessary to preserve intercommunication with areas outside the city, has been manufactured and installed to the specification of the Engineer-in-Chief's Department of the Post Office by the Automatic Telephone Manufacturing Co., Ltd., the present capacity of the automatic equipment being 1,500 lines with provision for ultimate expansion to 2,700 lines. The system is 4-digit, and the first selectors are equipped with a digit-absorbing feature and 600-point banks. The object is to enable the first selectors to function as second selectors when subscribers whose numbers lie in the 2,000 group are required: when the first digit 2 is dialled, the shaft ascends, carrying the wipers to the second level, but before it can cut in to this level the mechanism is automatically released, and a relay prepares the bottom line bank wipers for the next digit. The digit-absorbing feature is now cut out for the remainder of the call and the selector functions normally. For example, should the second digit be 2, the shaft again ascends with wipers to the second level, cuts in, selects an idle trunk, and extends the connection *via* the bottom bank to a final selector on the 2,200 unit. Special traffic meters have been installed to enable statistics to be compiled for future guidance. On the manual switchboard suite six operators' positions were already existing, and sections have been added to bring the capacity up to present requirements. The main batteries, of Chloride Electrical Storage Company's manufacture, have a capacity of 756 ampere-hours. The charging motor-generator has an output of 95 amperes at 57 volts, and the ringing dynamotors are in duplicate, one designed to run off the supply mains, and the other off the exchange battery in series with an impedance coil: automatic change-over facilities ensure maintenance of ringing current. Supervision is of the usual high order. A one-position test desk and a one-position supervisor's desk complete this latest successful addition to the Post Office's rapidly growing list of provincial A.T.M. (Strowger) equipped exchanges now in active operation. The Gloucester automatic exchange was cut into public service on February 12th, the city's population being 51,330, so that there is approximately one telephone to every 34 inhabitants.

LETCHWORTH SYSTEM.—The telephone system at Letchworth was changed to full common-battery working on February 23rd, when a new No. 10 switchboard was brought into use, replacing the old c.b.s. system. The new switchboard has initial equipment for 600 lines and was made and installed by Siemens Brothers & Co., Ltd.

Transatlantic Radio-telephony.—SERVICE EXTENSION.—Recent extensions of the transatlantic radio-telephone facilities have made the service available from any place in Great Britain to any place in the United States of America.

GERMANY.—Some days ago the London telephone authorities invited the German officials in the Frankfurt-am-Main exchange to try to establish communication with New York *via* London. The line proved to be excellent, and the experiment has since been repeated. A report on these two experiments has been sent to the Reichs Ministry, says *The Times*, and application has been made for the institution of a regular service.

HOLLAND.—The Hague correspondent of *De Telegraaf* understands that the Netherlands Post and Telegraph Administration intends shortly to undertake experiments with the object of establishing wireless telephone communication with North America *via* London and New York by means of the short-wave Marconi "beam" system. It is proposed to link up with the existing London-New York wireless telephone service by means of the submarine cable between Holland and Great Britain.—*Reuter* (Amsterdam). [There seems to be some confusion between the Marconi "beam" telegraph and the London-New York telephone services.—EDS.]

Radio Notes.

Germany.—ADVISORY COMMITTEES.—"Not supervision but promotion of broadcasting" was the motto suggested by State Secretary Dr. Hans Bredow, speaking as State Broadcasting Commissioner at the inaugural meeting of the Funk Stunde (Berlin) Advisory Committee (*Kulturbeirat*)—the first of a number of committees which will advise the existing broadcasting companies and replace the Programme Council which, after a life of only three months, expired on December 15th last. Their constitution was definitely stipulated in the broadcasting concessions granted to the companies a year ago. According to *World Radio*, apprehension has been expressed as to the effect of these officially appointed bodies, exercising only vaguely defined powers (except in so far as they suppress political tendencies) and without any definite responsibility, but Dr. Bredow does not share them.

Peru.—NEW REGULATIONS.—The Government having taken over all broadcasting in Peru, station OAX has become State property and new regulations have been issued by the Administration of Posts, Telegraphs and Wireless applying to all receiving sets. It is pointed out that a licence does not authorise the use of a set for commercial purposes; that single-wire antenna must not be over 100 ft. long, nor double wire over 140 ft.; that the owner of a set may not use in any way whatever information so received, and that if the owner wishes to remove his set to another locality notice must be given previously to the Director of Radio Telegraph Services. Licences will not be transferable and they may be revoked by the Director should any of the regulations be infringed.—*Reuter's Trade Service* (Lima).

Russia.—HIGH-POWER STATIONS.—The idea of erecting a 1,000-kW station, which has for some time been advertised widely in Soviet Russia, has been discarded as impracticable at the present moment, says *World Radio*. The Commissariat for Posts and Telegraphs has decided, however, that the immediate object of its constructive programme must still be to make multi-valve sets unnecessary by increasing the power of stations in several centres. There is much discussion as to what the power of individual stations should be, the most favoured proposal being that European Russia should have five or six stations of 25 kW (Moscow, Leningrad, Kharkoff, Tiflis, Saratoff, and Sverdlovsk *alias* Jekaterinburg), and about the same number of 10 kW each (Minsk, Kieff, Odessa, Kazan, and Rostoff-on-Don). Siberia presents a serious problem, being so vast and so thinly populated; the complete "radiofication" of Siberia has, therefore, been "postponed to the more distant future." A 10-kW station is being planned for Tashkent, to serve Turkestan.

South Africa.—JOHANNESBURG STATION CLOSES.—Lack of financial support has been the reason for the closing down of the "JB" (Johannesburg) station after having been in operation for over two years. Very strong efforts were made to enable "JB" to carry on, including a three-months' subsidy of £300 from the Johannesburg Municipality in the hope that some permanent arrangements would in the meantime be made to place the station on a sound footing, including Government support, but so far without effect. February 1st, however, was the time limit, and the station very reluctantly ceased to operate, but it was "on the air" again on February 5th, the Transvaal Radio League having arranged to carry on a partial service.

United States.—PROPOSED CENSORSHIP.—A Bill introduced by Assemblyman Edwin J. Coughlin, of Brooklyn, N.Y., at the present session of the New York Legislature in Albany, proposes the regulation and consorship of radio broadcasting. The Bill exempts from control stations owned by the Federal Government, by the State, and by a municipality. Privately-owned stations, however, would be required to obtain a certificate of necessity and convenience from the Department of Public Service. The annual licence fee for each station would be $100, and each would be required to deposit a bond of $10,000 as a guarantee that the rules and regulations laid down by the Public Service Commission would be observed. Under the terms of the Bill, the State would have jurisdiction over rates charged by commercial stations for broadcasting advertising matter, wave-lengths, and all pertaining to the operation of a broadcasting plant. The measure, if enacted, would become effective on July 1st, says *World Radio*, but existing stations would be permitted to operate without a licence until July 1st, 1928.

CONTROL BILL.—The Wireless Control Bill was signed by President Coolidge on February 23rd. The Bill, which is intended to prevent any wireless interest obtaining a monopoly of the ether, provides for the establishment of a Federal Wireless Commission which will have power to make regulations and grant licences. After a year the powers vested in the Commission will be transferred to the Secretary of Commerce, but the Commission will remain in existence as a sort of court of appeal. The Bill was passed by the U.S. Senate on February 18th.—*Reuter* (Washington).

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Aberdeen.—March 10th. Northern Co-operative Society, Ltd. Refrigerating and cold store installation. Messrs. Tawse and Allan, architects, 10, Bon-Accord Square, Aberdeen.

Adwick-le-Street.—March 21st. Urban District Council. Cables, boxes, pillars, and necessary materials and apparatus for a distribution network scheme. (See this issue.)

Ashford.—March 14th. Electricity Department. Two electrically-driven centrifugal pumps (capacity 30,000 gal. per hour). (February 25th.)

Australia.—MELBOURNE.—April 26th. Postmaster-General's Department. Telephone switches. (B.X. 3254).* Instrument cords. (B.X. 3255.)*
April 12th. Cord-type switchboards. (B.X. 3280.)*

Brecon.—March 16th. Electricity Department. Generating plant and switchgear, battery of accumulators and connections, underground and overhead lines. (February 25th.)

Bridlington. — March 9th. Electricity Department. Stores for 12 months, including lamps, electrical sundries, v.i.r. cables, &c. (February 25th.)

Colwyn Bay.—March 11th. Electricity Department. Twelve months' supply of cables, joint boxes, house service cut-outs, joint-box compound, sundry stores, house service meters. (February 25th.)

Dover.—March 9th. Harbour Board. Electrical cables and sundries for a year. Mr. Rutley Mowll, registrar, Castle Street.

Durham (Co.).—March 12th. County Council. Electrical work for the Seaham Hall tuberculosis hospital. W. and T. R. Milburn, architects, 19, Fawcett Street, Sunderland.

East Ham. — March 10th. Electricity Department. 3,900 yd. cable. (See this issue.)

Edinburgh.—March 5th. Education Authority. Electrical work at the new Technical School. Mr. J. Carfrae, architect, 3, Queen Street, Edinburgh.

March 21st. Twelve months' supply of cables, box frames and covers, house service fuse boxes and fuseboards, meters and meter boards. (See this issue.)

Hazel Grove and Bramhall.—March 23rd. Urban District Council. One oil circuit breaker and kiosk and seven 20-kW transformers and kiosks, cables and two e.h.p. substation switchgear panels. (See this issue.)

Holmfirth (near Huddersfield).—March 8th. Electricians' work required in connection with the erection of a children's ward at Holme Valley Memorial Hospital, Elmwood. Mr. P. N. Brown, architect, Hollowgate, Holmfirth.

Ilford.—March 8th. Electricity Department. Twelve months' supply of house-service boxes, lamps, main cut-outs, meters, and pavement box covers. (February 25th.)
March 22nd. One 500-kW rotary convertor, with transformer, switchgear, &c. (See this issue.)

India.—March 22nd. India Store Department. Two 250-kW Diesel-engine alternator sets, with switchgear, transformer, &c. (February 18th.)
30,000 oil insulators. (See this issue.)
DELHI.—March 17th. India Stores Department. Oil-engine-driven generator sets with switchboard. (B.X. 3264.)*

Kettering.—March 23rd. Electricity Department. E.h.p. and l.p. armoured cables and one 1,000-kVA transformer. (See this issue.)

Lithuania.—KOVNO.—March 10th. Department of Posts, Telegraphs and Telephones. Transformers, valves, &c., for the Kovno radio station. (B.X. 3283.)*

Littlehampton.—March 8th. Sussex Electricity Supply Co., Ltd. One 150-kW Diesel engine and generator, with auxiliaries, switchgear and cables. (February 18th.)

London.—BERMONDSEY.—March 16th. Board of Guardians. Six months' supply of electric lamps. Mr. H. H. Reeve, clerk to the Guardians, 283, Tooley Street, S.E.

Manchester.—March 18th. Electricity Committee. Three 500-kVA and two 250-kVA static transformers. (See this issue.)

Oldham.—March 7th. Board of Guardians. Electric lamps and fittings. Mr. Fred. W. Fletcher, clerk.
March 26th. Electricity Department. One 80-ton electric travelling crane. (See this issue.)

Rhondda.—March 26th. Electricity Department. Twelve months' supply a.c. ordinary and prepayment meters, mains and house service material. (February 25th.)

South Africa.—JOHANNESBURG.—March 19th. Municipal Council. Single-phase concentric cable. (B.X. 3236.)*
CAPE TOWN.—March 9th. Electricity Department. Insulated wire. (B.X. 3233.)*

South Elmsall.—March 19th. Electric lighting installation at Westfield Lane Council School. Education Department, County Hall, Wakefield.

Stoke-on-Trent.—March 8th. Electricity Department. De-aerating plant and electrically-driven boiler-feed pumps. (February 18th.) Twelve months' supply a.c. and d.c. meters, mains and cables. (February 25th.)

Torquay.—March 11th. Electricity Department. Two water-tube boilers with chain-grate stokers, induced draught plant, pipework and economisers. (February 18th.)

March 16th. One 6,000-kW turbo-alternator, with surface condenser and auxiliary plant. (February 25th.)

Tynemouth.—March 14th. Electricity Department. Three 250-kVA and one 500-kVA transformers. (See this issue.)

Warrington. — March 14th. Electricity Department. Motors and transformers. (February 25th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Aberdeen.—Corporation. Accepted:—
Electric lighting work for the new buildings, including restaurant, dance-hall, pavilion, shops, &c., at the Beach. Malcolm & Allan (£2,354 and £1,012, respectively).

Barking Town.—Electricity Committee.
1,000-kW motor convertor:—

Metropolitan-Vickers Electrical Co., Ltd. ...	£3,750
Bruce, Peebles & Co., Ltd.	4,158
Brush Electrical Engineering Co., Ltd. ...	3,262
British Thomson-Houston Co., Ltd.	4,350
English Electric Co., Ltd.	3,750
General Electric Co., Ltd.	3,749
General Electric Co., Ltd.	4,037
Ateliers de Constructions Electriques de Charleroi. (Recommended.)	**2,875**

Bexhill.—Electricity Committee. Recommended:—
Cable (£4,122).—Enfield Cable Works, Ltd.
Three seven-way feeder pillars (£158).—W. T. Henley's Telegraph Works Co., Ltd.

Birmingham.—Education Committee. Accepted:—
Electric light installation, Stechford Council School.—Brightside Foundry and Engineering Co., Ltd.
Electricity Committee. Accepted:—
Three centrifugal pumps at Nechells generating station.—Pulsometer Engineering Co., Ltd.
Transformers for Selly Oak sub-station, Brush Electrical Engineering Co., Ltd.; switchgear, A. Reyrolle and Co., Ltd.; installation of electric light at Town Hall, Allom Bros.

Bradford.—Tramways Committee. Accepted:—
Tramway poles (£2,332).—British Mannesmann Tube Co., Ltd. (in preference to a Continental tender at £1,899).

Chelmsford.—Essex C.C. Accepted:—
Internal telephone system for the County Offices (£101).—Mr. A. Shearman.

Dundee.—Electricity Committee. Accepted:—
Cable (£572).—Standard Telephones & Cables, Ltd. (The lowest foreign offer was £521, by the Bergmann Electrical Works, Ltd.)

Guildford.—Electricity Committee.
Converting plant for central sub-station:—

British Thomson-Houston Co.		£15,506
Bruce Peebles & Co., Ltd. (Accepted.) ...		**13,648**
English Electric Co., Ltd.		13,469
General Electric Co., Ltd.		13,246
Metropolitan-Vickers Electrical Co., Ltd. (for part only)		9,965

Baths Committee. Accepted:—
Filtration plant at swimming baths.—Bell Bros.
Works Committee.
Additions to air compressor plant at destructor works:—

Mather & Platt, Ltd.	(a)	£1,656
Mather & Platt, Ltd.	(b)	2,412
Worthington, Simpson, Ltd.		2,150
Reavell & Co., Ltd.		1,393
Browett, Lindley & Co., Ltd. (Accepted.) ...		**1,490**

Hull.—Electricity Committee.
Additional turbo plant—

Oerlikon, Ltd.	£61,900
British Brown-Boveri, Ltd.	76,374
Brush Electrical Engineering Co., Ltd. (Accepted.)	**84,332**
English Electric Co., Ltd.	87,776
C. A. Parsons & Co., Ltd.	88,000
Richardsons, Westgarth & Co., Ltd.	88,900
Jas. Howden & Co., Ltd.	88,985
Metropolitan-Vickers Electrical Co., Ltd. ...	89,660
Fraser & Chalmers Engineering Works ...	90,655
Do. Do. ...	92,639
Metropolitan-Vickers Electrical Co., Ltd. ...	92,640
British Thomson-Houston Co., Ltd.	92,928
Peter Brotherhood, Ltd.	95,124
Do.	96,543
Do.	97,202
Do.	98,621

Ilford.—Town Council. Accepted:—
12 miles of cable (£7,051).—Union Cable Co., Ltd. This was the lowest British tender, and was £1,051 above the lowest quotation.

Leeds.—General Purposes Committee. Accepted:—
Electrical fittings for a year.—Sun Electrical Co., Ltd., and Mr. G. Casperson.
Electricity Committee. Accepted:—
Cable: (£9,027) Macintosh Cable Co., Ltd.; (£8,388) W. T. Henley's Telegraph Works Co., Ltd.; (£4,183) Enfield Cable Works, Ltd.; and (£1,225) Greenwich Cable Works, Ltd.
Portable air compressor (£750).—Lead Wool Co., Ltd.
Double transformer kiosk (£275).—Yorkshire Switchgear and Engineering Co., Ltd.
15 three-phase truck type switches (£1,433).—English Electric Co., Ltd.
Six two-phase truck-type switches (£550).—Ferguson, Pailin, Ltd.
Four transformer kiosks (£496).—Park Royal Engineering Co., Ltd.
Health Committee. Accepted:—
Electric lamps for Seacroft Hospital.—Nox Electric Lamp Co., Ltd.
X-ray plant at tuberculosis dispensary (£687).—Watson and Sons (Electro-Medical), Ltd.

Letchworth.—First Garden City, Ltd. Accepted:—
1,000-kW La Cour motor convertor.—Ateliers de Constructions Electriques de Charleroi.

London.—Admiralty. Accepted:—
Insulated electric cable.—Edison Swan Cables, Ltd.

Oldham.—Electricity Committee. Accepted:—
Three 250-kVA transformers.—Ferranti, Ltd.

Padiham.—Urban District Council. Accepted:—
Wiring 50 houses on the Dryden Street housing site.—Mr. R. B. Beattie (Burnley).

Salford.—Electricity Committee. Accepted:—
1,773 yd. e.h.p. cable and 11,100 yd. l.p. cable (£5,547).—N.V. Nederlandsche Kabelfabriek, Delft, Holland.

Sheffield.—Electricity Committee.
Sub-station switchgear (£11,132).—A. Reyrolle & Co., Ltd. (Accepted.)
Tramways Committee.
1,500 mild steel tie bars.—Hadfields, Ltd. (Accepted.)

Stoke-on-Trent.—Electricity Committee. Accepted:—
3-phase static transformers and truck-type sub-station switchgear for 12 months.—Metropolitan-Vickers Electrical Co., Ltd.
Steam and water piping at central power house (£14,100).—Brightside Foundry & Engineering Co., Ltd.
Constructional steel work at power station (£2,574).—W. J. Jenkins & Co., Ltd.

West Ham.—Education Committee. Accepted:—
Installing electric light at South Hallsville Schools (£460).—Corporation Electricity Department.
The tenders varied from £417 to £711.

Forthcoming Events.

Ideal Home Exhibition.—Olympia, W. March 1st to 26th.

Electrical Power Engineers' Association (Southern Division).—Friday, March 4th. Institution of Electrical Engineers, London. 7 p.m. "The Installation and Maintenance of E.h.p. Cables." Mr. E. Bowden.

(Glasgow Section).—Friday, March 11th. Reid's Restaurant, Gordon Street. 7.30 p.m. "Illumination." Mr. H. E. Hughes.

Junior Institution of Engineers.—Friday, March 4th. 39, Victoria Street, S.W. 7.30 p.m. "An Evening with the Old Brigade."
Saturday, March 5th. Suffolk Street Galleries. 6.30 p.m. Annual dance.
Friday, March 11th. "Cupolas." Mr. J. Wolstenholme.

London Association of Foreman Engineers.—Saturday, March 5th. Cannon Street Hotel, E.C. 6 p.m. Anniversary Festival.

Association of Mining Electrical Engineers (South Wales Branch).—Saturday, March 5th. Cardiff. 6 p.m. Discussion, "Can Electricity Replace Compressed Air in the South Wales Mines?"

London Lighting Service Bureau.—Evening Illumination Design Course: Concluding Lecture. Monday, March 7th. 7.30 p.m. "Selling Better Lighting." Mr. W. E. Bush.

Institution of Electrical Engineers.—INFORMAL MEETING.—Monday, March 7th. London. 7 p.m. Discussion to be opened by Capt. P. P. Eckersley.

(North-Midland Centre). — Tuesday, March 8th. Hotel Metropole, Leeds. 7 p.m. Address by the President, Dr. W. H. Eccles, F.R.S.

(North-Western Centre). — Tuesday, March 8th. Engineers' Club, Manchester. 7 p.m. "Illuminating Engineering," Mr. J. W. T. Walsh; and "Problems of Public Lighting by Electricity," Mr. H. T. Harrison.

(Scottish Centre).—Tuesday, March 8th. North British Station Hotel, Edinburgh. 7 p.m. "High-power Fusible Cut-outs." Mr. L. G. Grant.

(South-Midland Centre).—Wednesday, March 9th. University, Birmingham. 7 p.m. "Illuminating Engineering," Mr. J. W. T. Walsh; and "The Problems of Public Lighting by Electricity," Mr. H. T. Harrison.

(Dundee Sub-Centre). — Thursday, March 10th. University College. 7.30 p.m. "The Jubilee Year of the Telephone." Mr. G. H. Taylor.

(North-Western Students' Section). — Saturday, March 5th. Manchester Municipal College of Technology. 7 p.m. Dance.

Institution of Rubber Industry.—Monday, March 7th. Engineers' Club, W. "Some Electrical Properties of Rubber." Mr. P. Dunsheath.

Society of Engineers.—Monday, March 7th. Burlington House, W. 5.30 p.m. Ordinary meeting.

British Electrical Development Association (North-East Area).—Wednesday, March 9th. Sopwith's Lounge, Newcastle-on-Tyne. 7 p.m. Discussion on W.O.B. Campaign.

Birmingham Electric Club.—Friday, March 11th. Grand Hotel. 7 p.m. Annual Dinner.

Physical Society.—Friday, March 11th. Imperial College of Science, South Kensington. 5 p.m. Ordinary meeting.

Notes.

British Insulated Cables, Ltd., Secures Big Contract for Indian Railway Electrification.

At the present time, when industry has to rely to such an extent on orders from overseas, it is of interest to note that British Insulated Cables, Ltd., of Prescot, has secured the contract for the main-line electrification of the Great India Peninsula Railway (Indian State Railways). The contract involves the equipment of 334 miles of track, running from Kalyan to Igatpuri in a northerly direction, and from Kalyan to Poona in a southerly direction, including sidings, storage yards, &c. The line to Poona includes the special equipment of the "Ghats," a particularly mountainous region, and about four miles of tunnels. The overhead equipment contains several novel features. The total section of copper to be carried per track is one square inch divided into three parts: 0.5 sq. in. main catenary, 0.2 sq. in. auxiliary catenary, and 0.3 sq. in. British standard section grooved contact wire. The main catenary is suspended at 220 ft. intervals by double porcelain disk insulators of the ball and socket pattern, and the contact wire is suspended by loop-type droppers from the auxiliary catenary, thereby providing an exceedingly flexible line. Provision for tensioning is made at distances of approximately one mile, and at these points every cable is dead-ended, the continuity of contact being maintained by a patented form of overlap span, which permits the tension stresses to be balanced, and so reduces to a minimum the amount of steel required in the structures at these points. Current is transmitted at 120,000 volts a.c. to sub-stations, where it is transformed to 1,500 volts d.c. for feeding the line.

Lake Lugano as a Reservoir.

For some time past engineering circles at Milan have been considering the use that can be made of the waters of the river Tresa, by means of which Italian river the overflow of the Lake of Lugano escapes; it is rumoured that the idea of Italian engineers is to utilise the difference of levels between the lakes of Lugano and Maggiore. A powerful waterfall would be thus constructed, capable of feeding considerable hydro-electric works, the buildings of which would naturally be erected on Italian soil. It is asserted that the greater part of the capital necessary for the enterprise has already been subscribed. The result of such a project would certainly have distinct repercussions in Switzerland, and the scheme is being followed with the greatest attention by the Tessinois Government. The building of a power house fed by the waters of the Lake of Lugano has a bearing on the question of the lake-level, which would be menaced or modified by the operation of hydro-electric works. Several of the lake-shore villages have already voiced their anxiety as to possible changes in water supply, and it is urged that the proposed use of the Lake of Lugano as a reservoir for Italian industry would be disastrous for certain Swiss villages on its banks. Swiss authorities, therefore, are keeping a sharp look-out on the developments of the plans that are being drawn up at Milan.

The Electricity (Supply) Act, 1926.

We have received from the Electricity Commissioners a "Memorandum on the Provisions of the Act" which they have prepared (H.M. Stationery Office, price 3d. net, post free 3½d.). It is announced by the Stationery Office that the Act has been reprinted, and the price reduced to 9d. net (post free 9½d.).

A New Electrical Illuminant.

A demonstration was recently given to the Press by Messrs. Fluor Light, Ltd., at their Shaftesbury Avenue, London, showrooms, of their new electrical illuminant, "Fluor Light," the invention of Mr. Ashton Wolfe, which they are introducing to the public. The light is produced in vacuum tubes at high voltage, 3,000 to 5,000 V, and by means of special electrodes at the ends of the tubes, containing a substance with a radium basis, gases are introduced which control the ether vibrations and thereby define the actual colour waves of the light. The gas also serves as a stabilising medium and renders the lighting, after a short period, quite steady. In addition to the variety of colours which can be obtained by this means for effective lighting, a most important feature is the production of true natural light, which should prove of great value in connection with colour matching in dye works and so on, and also to the medical profession, which, it is claimed, is giving the new illuminant favourable consideration. Another interesting feature is the possible production of only those light waves which are capable of penetrating fog, and this was demonstrated to some extent by creating an artificial fog in the room. The illumination was not obscured to any perceptible degree, and there was no halo observable around the light. It is claimed that the current consumption is 60 per cent. less than that for ordinary electric lighting by means of "half-watt" lamps. It is hoped to develop this means of illumination for ordinary house interior lighting by installing the tubes in a similar manner to ordinary cornice-lighting apparatus. The system has already been adopted for illuminated signs, and also for shop-window lighting. In the latter case the transformer and tube terminals and the leads are enclosed in glass tubing to afford adequate protection against accidental shock. The system can, of course, only be employed with a.c. supply.

The Electrification of French Railways.

The commercial counsellor at Paris informs the Department of Overseas Trade that the Southern Railway Co. is about to push on with its electrification programme, which has been temporarily in abeyance. It is stated that several lines will be completely electrified, including those from Pau to Laruns and from Pau to Bedous, with an extension to the international frontier station at Los Aranones. The last-named line will be operated in the course of 1928. The work is making rapid progress; the rails have been laid and stations are being built.

The British Legion.

The annual report of the British Legion shows that it has developed steadily on sound lines, and now has 2,774 branches in England and Wales. Unemployment was rife last year, but up to September 30th, 423 ex-service men had been placed, 2,625 introductions given, and 5,536 applicants for employment interviewed. Men are being trained in workshops, and others prepared for emigration. The number of disabled ex-service men registered at Employment Exchanges at the date of the report was 28,676, as compared with 32,350 in December, 1925. A full account is given of the administration and activities of the Legion. The relief fund (nine months) expended £147,092 on the relief of distress and for similar purposes.

Electrical Association for Women.

The first annual conference of the Birmingham and Midlands Branch of the Association was held recently at Birmingham, and was largely attended.

Mrs. Christine Frederick, in an address, pointed out the advantages secured by the use of mechanical appliances, but added that for their proper use a full and universal electricity supply at moderate rates was necessary.

At a luncheon presided over by Lady Brooks, president of the branch, Mr. H. K. Beale, chairman, Birmingham Electric Supply Committee, said that if any ladies were thinking of installing electricity in their homes, he would give them a tip: start with a kettle. Once it was seen how quickly and easily an electric kettle could be brought into operation, the rest of the household would be converted.

Mr. R. A. Chattock, city electrical engineer, said he was convinced that the women of this country would eventually insist on their homes being provided with electricity. Dr. S. Z. de Ferranti remarked that the great thing that stood in the way of electrical development was a general want of knowledge of the handling of the commodity and the apparatus connected with it. Visits were paid to the Nechells power station and the Witton Works of the General Electric Co., Ltd.

At the annual meeting of the branch, Professor W. Cramp said that the problem of cheaper electricity in this country would not be solved until that of electrical storage was solved.

The annual general meeting of the Manchester District Branch of the above Association was held on February 22nd, the chair being taken by Alderman Dagnall, chairman, Manchester Electricity Committee, when it was decided to re-elect all the officers and members of the committee. The meeting was followed by a lecture by Mrs. Christine Frederick, U.S.A., who described the methods adopted by American housewives to save labour in the home.

Faraday House Old Students' Association.

The Association has arranged to hold a dance on March 18th (8 to 12 p.m.), at Bush House Restaurant, Aldwych, in co-operation with the Faraday House Rugby Club. The dance will be the first of its kind and in some respects will take the place of the annual smoking concert. The price of the tickets is 8s. double (including light refreshments).

A Memorial to Faraday.

As we go to press we have received the following letter, with the tenor of which we cordially agree:—

I have read with great interest and appreciation the letter to you from the Mayor of Southwark published in your last issue, and think that he and the Borough of Southwark are to be congratulated upon the action it is intended to take in this matter.

It has always seemed to me that outside purely scientific circles the work of Faraday and the nature of its presentation to the public by him have received quite inadequate recognition. Of course, after the great lapse of time and under the stress of modern conditions of living and working, it is not easy for the present generation of electrical men to recognise and appreciate what it owes to his work and to the impetus it gave to the founding of our great industry.

But the efforts now being made by Mr. Hewitt serve as a reminder in this matter, and it is sincerely to be hoped that they will meet with complete success. With this object it is certain that the Electrical Review will be in complete sympathy.

A. C. Eborall, M.Inst.C.E., M.I.E.E.

Trafalgar House, S.W., *March 1st*, 1927.

Ideal Home Exhibition.

The eleventh Ideal Home Exhibition was opened at Olympia, London, on March 1st by the Hon. Mrs. Esmond Harmsworth. Many new features, both with regard to the decoration and lay-out of Olympia itself and the exhibits, are introduced this year. There are quite a number of electrical firms showing, and we hope to review their exhibits in a later issue.

Molybdenite as a Photoelectric Material.

According to Dr. W. W. Coblentz, of the U.S. Bureau of Standards, a piece of the mineral molybdenite, one of the chief sources of the metal molydenum, may replace the fragile photoelectric cell in some forms of scientific work. Dr. Coblentz has been studying what he calls the antinoelectric effect of molybdenite, the property that causes it to convert light energy falling on it into electrical energy. Previously he found that pieces of the mineral had closely adjacent spots which generated either positive or negative electricity. The result was that when the whole crystal was exposed to light the positive and negative currents neutralised each other, and very little effect was noted; but if a single spot was selected and illuminated, a current was produced of sufficient intensity to be indicated by a galvanometer. Recently, however, Dr. Coblentz has found crystals of which all the sensitive spots give the same kind of electricity, either positive or negative. When one of these crystals is completely illuminated, a considerable current, as compared with the others, is produced. By using vacuum tube amplifiers, the current may be magnified greatly and the crystal made available as a delicate detector of light. Such a crystal is sensitive to visible light waves and to the infra-red, or heat waves.—*Science.*

Electric Heating with Thermit Welding.

Electric heating has now been applied in connection with thermit welding by the Metal and Thermit Corporation, Jersey City, N.J., which has introduced heating units on its track-welding equipment to assist the vaporisation of the kerosene oil used for preheating the work. The oil is passed through the heating unit and is then mixed with compressed air at approximately 1 lb. pressure, after which it passes through a rubber hose to the torch used in applying heat to the rails. The heating unit also acts as a resistor. The equipment is electrically operated from the standard trolley circuit, and the group of two heating units connected in series is placed in series with the 230-volt d.c. motor that drives the air compressor. With this arrangement a snap switch can be used to start the motor as the heating units act as starting resistances.—*Times Trade and Engineering Supplement.*

Appointments Vacant.

Assistant mains engineer (£238) for the Peterborough Corporation Electricity Department. Mechanical and electrical draughtsman for the Air Ministry, W. & B. Department, Egypt. Temporary shift engineer for the Crewe Corporation Electricity Department. Plumber-jointer for the Hove Corporation Electricity Department. (See our advertisement pages to-day.)

The Engineers' Club (London).

During March eighteen meetings are being held at the Engineers' Club, including those of the Wireless Section of the I.E.E., the A.M.E.E., the Institute of Wireless Technology, and the Junior Institution of Engineers.

Battery Electric Rail Cars.

Recent annual reports of the railway companies of this country do not make pleasant reading. At a time when they are bemoaning their fate the lack of evidence of more apparent consideration being devoted to means of more economically utilising the many miles of expensive permanent way that exist in the form of country and branch lines seems strange. A steam locomotive hauling a normal train of from six to eight composite coaches is anything but pleasing if the carriages be nearly empty, and the only way of reducing the wasteful expenditure represented by such trains is to operate short ones on lines of that nature during those periods that traffic does not warrant the use of a standard train: in other words, a 'bus car on railway lines run often enough to ensure that reasonable service is provided. There are, of course, various methods of doing this, and undoubtedly there lies in this connection a great field for the use of battery electric coaches: Germany has found such vehicles to be quite a sound proposition, and an example in England was cited in our issue of February 18th, 1927, p. 264, whilst the installation of a rail-car service on the New Zealand Railway between Christchurch and Oxford West has proved so successful from the passengers' point of view that people deliberately wait for the electric car rather than travel by the steam train! An account of this interesting innovation appears in the *Electric Vehicle*, which commends the idea to the attention of those responsible for railway operation in this country.

Electrification of steam lines is admittedly a costly process, but fortunately the advantage of electric traction can be obtained without the necessity of electrifying the track; battery electric shunting locomotives have proved an eminently practical and economical proposition, while by keeping down the weight of the coach to a minimum, in some ways deviating from the expensive and heavy methods of construction that are employed in present-day railway coach design, it is quite practicable to produce a battery-driven coach that will prove a real boon both to railway companies and passengers on country lines, and for suburban services during the development period. Charging the batteries could be carried out at night, when electricity could be obtained at very favourable rates, or in areas where a public supply of electricity is not available petrol-electric charging stations could be installed (and used possibly during the day for giving a supply of power to consumers in the locality of the station).

The battery electric coaches for use on the branch line of the New Zealand Railways are designed on modern lines; the cars are fifty-five feet in length over the vestibules, seating accommodation being provided for 60 passengers in comfortable upholstered seats fitted with reversible backs. The two compartments are well lighted by wide windows, extending practically the full length of the car. The seats are spaced transversely on either side of a central aisle and, for night operation, electric light is supplied from a separate battery. While being tried in the Lyttleton-Christchurch service the first car was frequently called upon to carry as many as 140 passengers, and easily handled the heavy overload without any apparent effort. Power for the four 30-h.p. motors is supplied from 240 type A12.H Edison cells, sufficient for a 100-mile run under ordinary service conditions. This car was designed to maintain a speed of 35 miles per hour, but actually it has attained a speed of 40 miles per hour on long straight runs, and under service conditions a schedule speed of 35 m.p.h. is easily maintained. The car is provided with hand, straight-air and dynamic braking, the latter being primarily intended for holding the car to a reasonable speed on long down grades without the usual heavy wear on the brake blocks and wheels; the car is charged at night during "off peak" hours when power is available at a very low rate, and a return journey of 84 miles was accomplished with an expenditure of electrical energy from the battery amounting to 335 amp.-hours; the outward journey, owing to the gradients encountered, took about fifty per cent. more electrical energy than the homeward journey, for a considerable part of which the train was coasting. When it is not desired to take advantage of economies resulting from the design of lightweight coaches, it should be possible to convert old-type saloon coaches to battery electric coaches, and thus at minimum cost to put into operation electric motor-coach trains on lines at present expensively served by the usual steam locomotive of a size greater than the traffic calls for.

Fatalities.

A verdict of "Accidental death" was returned at the inquest on February 23rd on Mrs. Elizabeth Waterworth, who died recently from injuries received in an explosion that wrecked a house and shop in Beaconsfield Road, Acton Green. Evidence was given that fire was noticed to start where an electric cable entered the shop. It was stated that a few minutes before the explosion the electric light flickered and went out in a bakehouse 100 yards away. An electrician said that the distributor crossing the road to the premises had been partly blown out. A feeder cable laid in the road 25 years ago was encased in bitumen, but the distributor was modern, and had no connection with any bitumen. Periodical overhauling was carried out. The jury found that the explosion was accidental, but could not say how it was caused. It added a rider that the cable should be thoroughly overhauled.

The Times reports that Edward Brown, a Southern Railway driver, was killed by an electric shock on February 24th at Sutton station through his head touching an overhead electric wire while he was standing on the coal in the tender.

An inquest was held on February 16th, on the death of W. J. Thomas, of Trecynon, a shift engineer, employed by the Aberdare District Council for 12 years at the tramway depôt, who was killed by an electric shock on February 13th. According to the evidence reported in the *Aberdare Leader*, the deceased was working in a cubicle which had been made "dead"; nevertheless he touched live metal and was instantly killed. The switch, though interlocked, was found "just on." The verdict was "Death by misadventure."

An E.P.E.A. Dinner.

A company of over 100 attended the eighth annual dinner of the Portsmouth branch of the Electrical Power Engineers' Association, which was held at Kimbell's Café, Southsea, on February 19th. Mr. J. Ryan, chairman of the South Coast Section of the Association, presided, and among those present were Alderman A. Hemingway (chairman of the Portsmouth Electricity Committee), Mr. B. Handley, engineer and manager of the Portsmouth undertaking, and the Mayor and Mayoress of Chichester. The great developments that had taken place in the electrical world during the last 25 years were spoken of by Mr. H. Martin, Senior Electrical Engineer at Portsmouth Dockyard, in proposing "The Electrical Industry," and the beneficial effect of electricity upon health and comfort in home life was referred to by Alderman A. Hemingway in response. Councillor W. J. Lewis, vice-chairman of the Portsmouth Committee, also spoke of its potentialities in the future. Mr. Handley proposed "The Electrical Power Engineers' Association," remarking that the policy which the Association had pursued since its inception showed that it possessed wisdom, despite its youth. The conditions existing in the industry to-day, he added, had been largely obtained by the Association's efforts, and had been procured with hardly any turmoil at all. The Association had also got out a very good apprenticeship scheme. The chairman responded, and pointed out that the Association was not entirely out for remuneration. An excellent musical programme was arranged, and the evening concluded with dancing.

Institution Notes.

Institution of Electrical Engineers.

INFORMAL MEETING.—On February 21st, Mr. M. Whitgift was in the chair when Mr. R. O. Kapp opened a discussion on "National Bus-bars in Central Europe," describing his remarks as notes compiled on a holiday last year, but they showed a close and comprehensive survey of a large part of Austria, Germany, and Switzerland. He also had a number of slides showing the areas covered by interlinking, and remarked that Switzerland was the only country with an entire set of national bus-bars; they had come about by natural development into a complete system, but, consequently, without uniform voltages. Austria, with very little coal, but with much water-power, had turned to electrical development to help solve the problem of her acute post-war poverty, and truly remarkable progress had been made. The hydro-electric stations were detailed, and the great undertaking at Aachensee described in some detail, for from this station export of surplus power to Germany and Switzerland was now arranged. Germany had as yet no continuous system, but very extensive sets of mains carried power at 110,000 V over large areas. Long lines now operating at 110,000 V, it was contemplated, would be raised to 220,000 V, and were even designed for 380,000 V. An excellent discussion followed. Mr. W. E. Highfield said that Mr. Kapp had made extraordinarily clear the outline of the systems described. With regard to the comparative immunity from breakdown which was reported on the 110,000-V lines, Mr. Highfield said he had noticed that long spans of line had a better vibration period and often suffered fewer stresses. He had observed, too, that with the supply to rural districts in South France the saving in cost was not made on the h.p. lines, but on the l.p. distribution.

LONDON STUDENTS' SECTION.—Improvements have been made in the programme for the second half of the session. To-night there will be a theatre party at Victoria Palace, an item which has just been re-instituted after a lapse of two years. Next Friday there will be a joint meeting with the Students' Sections of the Institutions of Civil and of Mechanical Engineers for a discussion on "Patents," to be opened by Mr. A. C. Price, and on Friday, March 18th, the twentieth annual dinner will be held at the Imperial Hotel, Russell Square. This year the dinner will be more enjoyable and informal than usual. Dr. W. H. Eccles and Capt. P. P. Eckersley have promised to be present.

Association of Consulting Engineers (Incorporated).

On Wednesday last week the annual dinner of the Association was held at St. Stephen's Club, Westminster, about 150 members and guests sitting down, with Mr. W. J. E. Binnie, chairman of Committee, presiding. Amongst those present were Sir Charles Parsons, Sir Joseph Cook, Sir Alex. Gibb, Sir Harry Haward, Mr. W. W. Lackie, Sir Halford Mackinder, Mr. C. le Maistre, Sir Ernest Moir, Col. R. K. Morcom, Mr. Basil Mott, Mr. S. L. Pearce, Col. T. F. Purves, Lord Queenborough, Sir Henry Slesser, Sir Henry Tanner, and Mr. T. P. Wilmshurst. After the loyal toasts, Sir Cyril Kirkpatrick proposed "The British Empire," remarking that the work of engineers brought its components closer together—aviation in particular was annihilating time and space. The Hon. Mr. J. S. Smit, High Commissioner for the Union of South Africa, in responding, repelled the charge that South Africa preferred foreign markets to the British. Mr. S. C. Lewis proposed "The Bench and Bar," Lord Hanworth, Master of the Rolls, and Mr. W. E. Tyldesley Jones responding. The toast of "Science" was proposed by Lt.-Col. N. G. Gedye, who emphasised the close interdependence of pure science and engineering in these days; Dr. J. V. Elsden, responding, pointed out that the pure science of to-day was the applied science of to-morrow. Mr. Fredk. Palmer, president, Inst.C.E., proposed "The Association of Consulting Engineers," and the chairman, responding, said that the Association owed a debt of gratitude to the honorary officers, especially the hon. secretary, Mr. A. H. Dykes, who devoted an immense amount of time and labour to its interests. The hon. treasurer, Mr. S. R. Lowcock, having resigned, the members had presented him with a desk and bookcase; Mr. S. C. Lewis was his successor. Mr. Lowcock was called upon to speak, and expressed his grateful appreciation of the present and of the very great kindness he had experienced from the members during the past 20 years.

Junior Institution of Engineers.

At the meeting held on February 25th, Dr. C. M. Walter showed a number of photographs and four kinematograph films taken by him during his recent visits to the Norwegian fjords, which held the interest of the members for over two hours. To-night the "Evening with the Old Brigade" will be opened at 7.30 p.m. by Mr. Walter T. Dunn, M.I.Mech.E., secretary of the Institution for the first 27 years, and member for 43 years; afterwards past-chairmen successively will occupy the chair, and lecturettes will be delivered by other members of long standing.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

Representatives of East Midland electricity authorities assembled at Nottingham on Thursday last week, when a presentation was made to Mr. T. P. Wilmshurst, late borough electrical engineer of Derby, in recognition of his appointment as an Electricity Commissioner. Mr. Wilmshurst was invited to accept a small copy of the historic vase which forms one of the notable treasures of Warwick Castle, and he was also given a wristlet watch. Alderman Huntsman, who made the presentation, observed that in the area covered by the operations of the Board of which he had the honour of being the chairman, they had never faltered in their support of the technical policy to which the new Act was intended to give effect. That area was about the only one in which stubborn opposition had not been presented to the policy. His only doubt about the future success of the policy which should be carried out was that its execution would have to be entrusted to some of the men who had been its most strenuous opponents. The electricity supply industry had been singularly fortunate in having had at its disposal the services of those who constituted the Electricity Commission, who were not only technically eminent, but were also just, courteous, and devoted to the public interest. In the East Midlands area the authorities had prepared themselves to co-operate in carrying out whatever might be called for with regard to a larger policy. They would, however, be poorer in that area by reason of the circumstance that he who had presided over other able electrical engineers and who had guided their footsteps, would be no longer with them to give them the benefit of his knowledge. He felt that they owed a vast debt to the wise judgment of Mr. Wilmshurst. Mr. Wilmshurst, in responding, observed that one reason for the friendly feeling which prevailed in the area was to be found in the large humanity of the chairman of the Board, Alderman Huntsman. An excellent example was furnished by the time and ability which such men as he devoted to the public service. He believed that the new Act constituted a great landmark in the electrical history of the country. It had been suggested that it would prove of no use to towns which were making cheap electricity; but it should be remembered that two-thirds of the places in the country had either no supply at all or only poor supplies. The Act would not rectify everything at once, but it would provide "tapping points" in rural districts, so that a supply could be given at a reasonable price. The scheme for central industrial Scotland was now completed and ready for transmission to the Board, and that for Central England, embracing the territory from North Derbyshire to the Thames, would be ready for transmission within the next two or three months. These schemes had been prepared with the most meticulous care. Not a single authority would be penalised by the Act, and when all the transmissions had been completed every authority in the country would benefit therefrom.

The Government *Gazette*, Gold Coast Colony, recently announced that Mr. F. T. BILLINGSLEY, assistant electrical engineer, Gold Coast Government Railways, had been appointed to act as chief electrical engineer to the Railways from November 7th, 1926.

Dr. S. Z. DE FERRANTI has been selected by the Council of the Royal Society for election as a Fellow of that body.

The Lancaster Town Council last week decided to increase the salary of Major G. C. MILNES, M.C., the borough electrical engineer since 1910, from £680 to £780.

The Leeds Corporation Electricity Committee recommends increasing the salary of Mr. C. NELSON HEFFORD, the manager of the Electricity Department, from £1,600 to £1,650 per annum.

At a social gathering at Keyham in connection with the electrical department of Devonport Dockyard, a presentation, consisting of a pair of binoculars, was made to Mr. HOWE, assistant electrical engineer, upon his approaching departure for Gibraltar.

On resigning his position as electrical engineer at the Winwick Mental Hospital, Mr. A. DAVIS was presented with a gold watch by the staff.

Dr. S. ENGLISH, D.Sc., F.I.C., F.Inst.P., late Senior Lecturer in the Department of Glass Technology, Sheffield University, has joined the staff of Holophane, Ltd., as Research Engineer, in connection with the use of glass in all types of illumination.

Obituary.—SIR J. HARMOOD-BANNER.—We regret to record the death of Sir John Sutherland Harmood-Banner, which occurred on February 24th, at the age of 80 years. By profession he was an accountant and had very large business interests. He was a member of the House of Commons for many years. The honour of knighthood was received in 1913, and he was created a baronet in 1924. He was very closely associated with the electrical industry and at the time of his death was vice-chairman of the following companies:—British Insulated Cables, Ltd.; Midland Electric Corporation for Power Distribution, Ltd.; the Electric Supply Co. of Victoria, Ltd.; the Electric Supply Co. of Western Australia, Ltd.; and the Telegraph Manufacturing Co. (Colonial), Ltd. He was also a director of the Automatic Telephone Manufacturing Co., Ltd., and the La Plata Electric Tramways Co., Ltd.

MR. C. E. DAVIES.—The death has occurred, at his residence, Church End Farm, Billingham, following an attack of pneumonia, of Mr. C. E. Davies, electrical engineer on the staff of the Chief Engineer to the Synthetic Ammonia and Nitrates, Ltd., Billingham, near Stockton. Mr. Davies, who was 54 years of age, had had a wide experience in electrical engineering, in London, Cardiff, and South Wales. He went to Billingham about five years ago from the British Thomson-Houston Co., Ltd., Rugby.

MR. R. W. HOGARTH.—We regret to learn of the death of Mr. Robert W. Hogarth, senior partner in the firm of Buchan and Partners, consulting engineers, of London and Edinburgh. Mr. Hogarth, whose years did not number many over fifty, is described as a pioneer in Scottish water power utilisation, and as being prominently identified with important Scottish electrical development schemes, including the Fall of Clyde hydro-electric scheme, for which he acted as consulting engineer to the promoters.

MR. H. O. H. WENMAN.—The death has taken place at Smethwick of Mr. H. O. H. Wenman, who was the pioneer of electricity at Bishop's Castle, Salop. Many years ago he purchased the old gasworks, where he installed electrical plant.

DR. LUIGI CASALE.—Quoting the *Chemical Age*, the *Daily Telegraph* reports the death at Milan of Dr. Luigi Casale, inventor of the Casale process for the fixation of atmospheric nitrogen.

ALD. J. W. HENDERSON.—The death has taken place suddenly of Ald. John Watt Henderson, chairman of the South Shields Corporation Electricity Committee and a former mayor. He was for many years vice-chairman of the Tramways Committee.

Wills.—The late MR. C. L. TROUP, electrical engineer, of Victoria Dock Road, Canning Town, left £5,518 net and £7,977 gross personalty.

The late Sir FRANCIS FOX left £40,615 gross and £32,345 net personalty.

Financial Section.

New Companies, Returns of Share Capital, Debenture Changes, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

W. G. Hodgson & Co., Ltd.—Private company. Registered February 24th. Capital, £1,000 in £1 shares. Objects: To acquire the business of an electrical engineer and contractor now carried on by W. G. Hodgson at 7 and 8, Broad Street, Cheapside, E.C., as "W. G. Hodgson & Co." The permanent directors are:—W. G. Hodgson, A.M.I.E.E., 24, Nella Road, W.6, electrical engineer; Mrs. E. Hodgson, 24, Nella Road, W.6. Qualification, £100 shares.

Phone Conversion, Ltd.—Private company. Registered February 22nd. Capital, £3,000 in £1 shares. Objects: To carry on the business of electricians, mechanical engineers, manufacturers and workers of and dealers in electricity, manufacturers of and dealers in wireless apparatus, &c. The subscribers (each with one share) are:—A. Marr, 23, Reynell Road, Longsight, Manchester, telephonic expert (late Lieut. R.A.F., Technical); Col. A. Young, 135, Colinton Road, Edinburgh, surgical instrument manufacturer. A. Marr is permanent governing director. Qualification, £100. Registered office: Leinster Chambers, 4, St. Annes Square, Manchester.

J. L. Gottlieb & Co., Ltd.—Private company. Registered February 21st. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in drawn wire, electric cabling, electric lamps, and all parts used in connection with electrical, telegraphic, telephonic, and wireless instruments, &c. The first directors are:—Miss Kathleen Hosler, 19, College Road, Bromley, secretary; J. L. Gottlieb, 10, Hillcrest Avenue, Golders Green, N.W.11, merchant (permanent). Secretary: F. Lacey. Registered office: 89, Upper Thames Street, E.C.4.

Red 'Phone Book (Newcastle), Ltd.—Private company. Registered February 22nd. Capital, £500 in £1 shares. Objects: To adopt an agreement with The Trade Telephone Books, Ltd., to carry on and develop the business of publishers of "The Red X Phone Book," &c. The first directors are:—D. I. Munro, "Lynn Garth," Gowland Avenue, Milvain Estate, Newcastle-on-Tyne; J. W. Driffield (permanent managing director), 6, Curtis Road, Newcastle-on-Tyne. Qualification, £10 shares. Solicitor: V. Hadaway, 50, Pilgrim Street, Newcastle-on-Tyne.

Lincoln Radio Supplies, Ltd.—Private company. Registered February 25th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers, assemblers, installers and repairers of wireless telegraphic, television and telephonic apparatus, &c. The directors are:—C. W. Cottam, 15, The Strait, Lincoln; A. G. Shipley, The Limes, Lindum Terrace, Lincoln. Qualification, 50 shares. Secretary: H. R. Sharpe. Solicitors: Langley, Stevens & Phillips, 34, Silver Street, Lincoln. Registered office: 14, Silver Street, Lincoln.

British Electric Meters, Ltd.—Private company. Registered February 24th. Capital, £50,000 in £1 shares. Objects: To acquire from R. W. Jolly, N. B. Coop and Meters, Ltd., certain letters patent or patent rights relating to electric meters; and to carry on the business of manufacturers of electric and other meters, dynamos, magnetos, storage batteries, electric motors, lamps, bells, horns, telephones, telegraphs, &c. The subscribers (each with one share) are:—R. W. Jolly, 10, South Park Road, Wimbledon, S.W.19, electrical engineer; N. B. Coop, "Hartford," Ebbenston Road, Colwyn Bay, electrical research engineer. The first directors are to be appointed by the subscribers. So long as Meters, Ltd., holds more than one-half of the capital, it may appoint five directors. Qualification, £200 shares. Manager: R. W. Jolly. Solicitor: J. R. Knott, 103, Union Street, Oldham. Registered office: 45, Westminster Bridge Road, S.E.1.

Clear Hooters, Ltd.—Private company. Registered February 16th. Capital, £2,000 in £1 shares. Objects: To carry on the business of manufacturers of, agents for and dealers in electric horns and hooters, and all kinds of electrical, mechanical, and other signalling devices, &c. The first directors are:—J. H. Mills, Heath Lea, Castle Bromwich, motor accessory manufacturer; T. S. Rogers, 25, Edmund Lane, Saltley, Birmingham; L. J. F. Austin, "Sherington," Hadzer Road, Warley, Worcs., C.A. Qualification, 2 shares. Registered office: Lichfield Chambers, 1-2, Upper Priory, Birmingham.

Official Returns of Electrical Companies.

Walker, MacEwen & Co., Ltd.—E. H. Willoughby, of 63, Loraine Mansions, N.7, was appointed receiver (in place of E. L. Holford), on February 8th, 1927, under powers contained in debentures dated November 30th, 1922.

Deansgate Electric Radio (Manchester), Ltd.—C. A. Leeming, of 11, Dartmouth Road, Whitefield, Manchester, was appointed receiver and manager on February 9th, 1927, under powers contained in debenture dated January 10th, 1927.

Almondsbury and District Electric Supply Co., Ltd. (183,582).—Capital, £3,000 in 1,000 preference and 2,000 ordinary shares of £1 each. Return dated December 16th, 1926. 1,000 preference and 1,115 ordinary shares taken up. £2,115 paid. Mortgages and charges, nil.

Auto Mechanical Rectifiers, Ltd.—R. S. Andrews, of 448, Strand, W.C.2, ceased to act as receiver or manager on February 14th, 1927.

Electricity Distribution of North Wales and District, Ltd.—Second mortgage debenture dated February 10th, 1927, to secure £150,000, inclusive of £100,000 secured by charge dated March 12th, 1926, already registered, charged on certain freehold and leasehold properties at Rhyl, Meliden, Denbigh, Sandbach, Alsager, Elsworth and Flint, and the company's undertaking and property, present and future, including uncalled capital. Holder: H.M. Treasury Solicitor.

Newton Brothers (Derby), Ltd.—Satisfaction in full (1) on January 10th, 1927, of mortgage dated May 29th, 1923, securing £12,000; and (2) on February 11th, 1927, of debentures dated September 16th, 1925, securing £50,000.

East Lancashire Electrical Co. (Accrington), Ltd. Capital, £3,000 in £1 shares. Return dated August 10th, 1925 (filed January 15th, 1927). 1,475 shares taken up. £1,325 paid. £150 considered as paid. Mortgages and charges, nil.

Neutron, Ltd.—R. S. Andrews, C.A., of 448, Strand, W.C.2, was appointed receiver (with other powers) on February 7th, 1927, under powers contained in second mortgage dated November 5th, 1926.

Accumulators of Woking, Ltd.—H. T. Witt, of 5, Chancery Lane, W.C., was appointed receiver on February 16th, 1927, under powers contained in debenture dated November 30th, 1920.

C. & J. Arrigoni & Co., Ltd.—H. F. Crowley, of 65-66, Chancery Lane, W.C.2, was appointed receiver on January 24th, 1927, under powers contained in debentures dated December 4th, 1925.

Liverpool Electric Cable Co., Ltd.—Capital, £50,000 in £1 shares. Return dated December 14th, 1926. All shares taken up. £7,833 paid. £42,167 considered as paid. Mortgages and charges, £1,372 3s. 7d.

City Notes.

The "Underground" Group.

The annual meetings of the four electric railway companies and the London General Omnibus Co., Ltd., forming this group, were held on February 24th, Lord Ashfield (chairman) presiding. In moving the adoption of the reports and accounts, which were dealt with at length in our last issue, the chairman said that having regard to the troubles of the year, the position could be considered satisfactory; the companies had come through without permanent impairment of their financial condition. The working of the Common Fund had permitted the repetition of the 1925 dividends; the railway companies, which had suffered, had benefited by the larger contribution of the omnibus company. Although the railways had been extended, they lost nearly nine million passengers. Had it not been for the industrial troubles, all the members of the group would have shown a record expansion. To indicate the effect of the general strike upon their traffic, Lord Ashfield mentioned that there were no fewer than 28,000 factories of all sizes in the Greater London area. Even after the resumption of work, the effects continued to be felt, and they spread to the residential areas, depleting the shopping crowds which the companies normally carried. As a consequence, the number of journeys per head of the population served had fallen from 503 to 494. The traffic on the extended City and South London Railway continued to grow rapidly, but the Edgware extension traffic had not advanced as quickly as was anticipated. They hoped for good results from the erection of houses at Burnt Oak and Morden by the London County Council. Inquiries by the London Traffic Advisory Committee had shown that further underground railways were wanted, and the companies would be gratified to undertake the work, with some of which they were in cordial agreement. Unfortunately, the capital costs would be enormous, and in their present condition the companies could never raise the amount of money required at reasonable rates. The Committee would have to wait until means had been devised of assuring the companies an adequate return upon the money which they had already spent. Many working economies had been effected, and the cost of operation per car-mile had thereby been reduced, but in the meantime further burdens in the way of taxation had been imposed, especially upon the motor-'bus undertaking. Income tax had proved a very onerous burden to the whole group; while the ordinary shareholders received £648,000, the Government received £751,000 out of the year's earnings. In conclusion, Lord Ashfield said he hoped that in future it would be realised that the stoppage of a public utility was not a legitimate means of furthering an industrial dispute.

The report and accounts were adopted.

London Tramway Companies' Reports.

Four of the London tramway companies published their reports for the year ended December 31st, 1926, last week, and these are summarised below. The annual meetings were to be held on March 2nd:—

South Metropolitan Electric Tramways and Lighting Co., Ltd.—The balance on working (net income) was £46,081, as compared with £48,248, and after deducting interest, rentals, and other fixed charges, a balance of £36,495 remains, plus £10,244 brought forward. From this £15,000 is again allocated to renewals, a dividend of 5 per cent. is to be paid on the ordinary shares (as for 1925), and a balance of £9,379 is carried forward.

Metropolitan Electric Tramways, Ltd.—There was a loss on working of £3,844, the traffic revenue being £628,569 and the expenses £632,413. Other income amounted to £127,047, which gave a net income of £123,203, as compared with £110,066 in the preceding year. After meeting interest, rentals, and other fixed charges, there was a deficiency of £28,788, as compared with £43,846 in 1925.

London United Tramways, Ltd.—The traffic receipts amounted to £390,894 and the expenditure to £363,698, leaving net receipts of £27,196, to which is added £7,006 representing other income, making £34,202. After meeting interest, rentals, &c., there is a deficiency of £20,070, as compared with £29,149 in 1925. A total deficiency of £65,575 is carried forward.

London and Suburban Traction Co., Ltd.—This company, which combines the foregoing companies and the Tramways (M.E.T.) Omnibus Co., reports total receipts from dividends, &c., of £52,583. Expenses amounted to £49,880, leaving a net revenue of £2,703. To this is added £17,066 brought forward, making £19,769, which has been carried forward. The previous year's net revenue was £4,362. The summarised figures of the four companies show that the number of passengers carried rose by 393,543 to 282,844,803, while the gross receipts at £2,134,636 were £3,643 higher; the net deficiency was £6,185.

North Metropolitan Electric Power Supply Co.

The net revenue for the past year was £293,195 (as against £315,292), and to this is added £6,676 brought forward, making £299,871. After providing for debenture interest and redemption and transferring £100,000 to reserve, there remains £154,706. As already reported, the final ordinary dividend is at the rate of 10 per cent. per annum, and £9,149 is carried forward. The capital expenditure during the year was £510,197, mainly in respect of plant, machinery, trunk and distributing mains, and new sub-stations. Approximately 145 miles of mains was laid and 39 new sub-stations were put into service. The energy sold rose from 112,000,000 to 118,900,000 kWh, and the number of consumers, supplied directly or indirectly, from 56,000 to 69,000. The financial results were adversely affected by the company's policy of not increasing charges to consumers on account of the coal dispute; indeed, in certain districts the rates were reduced. Supply was commenced during the year to Boreham Wood and Elstree, Cuffley, Great Amwell, Harmer Green, Stanstead and Wormley. The report makes reference to the registration of the North Metropolitan Power Station Co., Ltd., which has received a Government guarantee for £850,000 of 5 per cent. debenture stock, providing funds for the construction of the Brimsdown station. Since the last report 199,980 ordinary and 300,020 6 per cent. cumulative preference shares have been issued at a premium, and the total premium (£55,620) has been transferred to reserve. The holders of the 8 per cent. second preference stock have received notice that their holdings will be redeemed at par on July 1st, but they will be given an opportunity of exchanging the stock for new stock or shares. A Bill has been deposited in the present session of Parliament to increase the authorised capital by £1,500,000 and to extend the borrowing powers. The annual meeting was held on Tuesday last.

Lancashire United Transport and Power Co., Ltd.

The total receipts of the combined undertaking for 1926 were £283,177 and the gross profit £54,454. The loss of profit occasioned by strikes is estimated at £20,000. Motor-'bus and sundry receipts, including an amount received from the South Lancashire Tramways Co., amounted to £147,591. After deducting depreciation and interest, &c., on first mortgage stock, it is proposed to pay interest at 4 per cent. on the second mortgage stock and to carry the balance (£122) to depreciation account.

Sir Arthur Stanley, G.B.E., presided at the annual meeting on February 24th, and in moving the adoption of the report, said that the tramway traffic had been depleted by the general strike and the coal dispute, but the number of passengers carried by the omnibuses had increased. The profit on the sale of electricity (£11,381) was by far the highest yet obtained. The company had borne its troubles well, and a period of industrial tranquillity was now looked forward to. The prior lien debenture stock had been redeemed out of the proceeds of an issue of first mortgage debenture stock. The report and accounts were adopted.

Midland Counties Electric Supply Co., Ltd.

The trading profits of the undertakings owned and operated by this company for 1926 amounted to £186,189. From this the undertakings appropriated £21,625 for depreciation and reserves. Including £4,733 brought forward, the balance at credit and profit and loss account is £162,905. As announced last week, a dividend at the rate of 6 per cent. has been declared. £6,183 is transferred to debenture redemption account, and £10,000 to reserve, leaving £4,023 to be carried forward. The progress of the lighting and power undertakings continued, but at a lower rate, on account of the coal dispute. The traction properties were seriously affected, and did not show improvement. The company continued the extension of its network, and good results were obtained from the extensions. The amounts set aside for reserve and depreciation are lower on account of the loss of revenue due to the coal stoppage. During the year 250,000 preference and 250,000 ordinary shares were issued. The meeting was held on Tuesday last.

German Companies.

The directors of the *Siemens and Halske Company*, in their report for 1925-26, state that although the influx of orders was not greater than in the previous year, standardisation and improved methods of production gave larger profits. It was possible to lower prices in important branches. The orders received from abroad exceeded those booked in the previous year, notwithstanding the difficulties of high tariffs and other

protective measures. In the telephone cable branch, while orders from the Reich postal authorities had been few, large orders were received from Belgium on reparation account for the Vienna-Passau route, and also indirectly for that between Vienna and Budapest, and connecting links were also delivered for the connection of Switzerland and Holland to the German network. Large orders for automatic telephone plant were received from Italy, Japan, and Finland.

The report of the *Siemens-Schuckert Works* states that, despite the falling off of orders, the turnover was greater than in 1924-25. Greater attention was devoted to foreign business, although conditions were difficult. Large orders were received in connection with the Shannon hydro-electric scheme, and the company obtained important Russian orders. The works erected with the support of the company in Japan suffered from the economic difficulties in that country. An improvement occurred at the close of the year, orders being received from the iron and steel industries. Orders from the chemical industry had been satisfactory, and the business with the electricity supply concerns was about on the level of that in the previous year. The cable and overhead line branches were satisfactory. Large orders are expected in connection with the electrification of the Berlin city railway.

Belgian Company.

The *Union Electrotechnique* (*S.A.*), which absorbed an already existing firm in 1925, has issued its report covering the 14½ months to the end of 1926. The directors state that the results for this period were satisfactory, the net profits being 173,000 fr., permitting of the payment of interest on instalments and a "super-dividend" of 5 fr. per share. It is stated that the exports have increased by 253 per cent.

Ceará Tramway, Light and Power Co., Ltd.

The report for the year ended June 30th, 1926, shows a rise in the net receipts from 994,780 milreis to 1,043,915 milreis. The increased tariff which was put into force during the year was offset by wage increases, and the rise was due to the expansion of the lighting and power section of the business. A rise in the value of the milreis increased the sterling net results, but the exchange has since fallen. Although the results from the tramways are disappointing, there appears to be a steady improvement, and expenses should not increase. Out of the year's profits £12,026 has been put to reserve. If the results of the next few months warrant it, the directors propose to pay a dividend not exceeding 2½ per cent., free of tax, upon the issued capital.

Mersey Railway Co.

Speaking at the annual meeting on February 24th, the chairman (Mr. J. Falconer) said that in spite of the industrial disputes, the traffic had been maintained last year. After December 31st, 1925, the interest on certain classes of debenture stocks had become a fixed charge upon the revenues of the company, and since that date had been paid half-yearly. The company's report was summarised in our last issue (p. 312).

Quebec Power Co.

The *Financial Times* states that the report for 1926 shows gross income of $1,238,301, compared with $1,046,943 in 1925. Operating expenses were $271,034, compared with $236,644, leaving net operating income at $967,267, compared with $810,499. The report shows $7.84 per share earned on common stock, compared with $6.07 on less stock in 1925 and $4.37 on still less stock in 1924.

Stock Exchange Notices.

The undermentioned have been ordered to be officially quoted:—

County of London Electric Supply Co.—1,773,334 ordinary shares of £1 each, fully paid, Nos. 1,330,001 to 1,500,000 and 5,000,001 to 6,663,334.

South London Electric Supply Corporation.—234,000 ordinary shares of £1 each, fully paid, Nos. 310,001 to 544,000.

Launceston and District Electric Supply Co., Ltd.

A gross profit of £2,158 was reported at the annual meeting on February 18th. The vice-chairman (Mr. W. H. Symons) said that a number of new houses were being wired, including the last batch erected by the Council, and with the exception of eight or nine, all the business establishments in the town were consumers of electricity. A dividend of 6 per cent. was declared.

Montreal Light, Heat and Power Co.

The report for the past year records a gross revenue of $18,907,382 and a net income of $7,082,567. Dividends absorbed $5,135,041, insurance fund $58,644, and pension fund $20,000, leaving $1,869,482 to be transferred to capital and surplus. The report refers to a re-arrangement of the debenture capital during the year.

National Gas Engine Co., Ltd.

The profit for the past year was £27,467, and to this is added £15,894 brought forward, making £43,361. After meeting the preference dividend, it is proposed to pay a dividend of 2½ per cent. on the ordinary shares, leaving £16,360 to be carried forward.

Colombo Electric Tramways and Lighting Co., Ltd.

Negotiations have been reopened with the Ceylon Government for the sale of the company's power plant and distribution system. The company previously accepted an offer of £250,000, but cancelled the acceptance later on account of a variation of the terms.

Atlas Light and Power Co., Ltd.

The directors of this company (formerly the Argentine Light and Power Co., Ltd.) have declared an interim ordinary dividend of 2 per cent. No interim dividend was paid last year, but the full dividend was 4 per cent.

Direct West India Cable Co., Ltd.

A dividend at the rate of 3½ per cent. per annum, free of tax, has been declared on the ordinary shares for the past half year, as compared with a rate of 10 per cent. last year.

Halifax and Bermudas Cable Co., Ltd.

The ordinary shares are to receive a dividend at the rate of 10 per cent. per annum, free of tax, for the past half year, as in 1926.

Elgin Electric Supply Co., Ltd.

The profit for the past year was £1,447, as compared with £836 for 1925, and after paying a dividend of 5 per cent., £669 is carried forward.

Telegraph Construction and Maintenance Co., Ltd.

A final dividend of 7½ per cent., free of tax, is recommended, making 10 per cent., free of tax, for the year, as for 1925.

American Telephone and Telegraph Co.

A quarterly dividend of $2¼ per share has been declared on the common stock, as in 1926.

Pennsylvania Water and Power Co.

A quarterly dividend of 2 per cent. has been declared on the capital stock.

Canadian General Electric Co., Ltd.

A dividend of 1¾ per cent. has been declared on the preference stock for the quarter ending March 31st.

Stocks and Shares.

MONDAY EVENING.

WHILE the tendency of prices in the purely gilt-edged market remains dull—almost depressed—the disposition in other Stock Exchange departments is to put things better. A considerable volume of business is afoot. Slowly it becomes obvious that one effect of the war was to introduce Stock Exchange affairs to wide circles of the population which, previously, put their savings into the Post Office or equivalent old stockings. Every new issue that appears nowadays is accorded a closer inspection than it would ever before have received, and the war loans, so vigorously pushed by the Government, proved the means for popularising, to a remarkable degree, the wares of the Stock Exchanges.

The markets with which we deal here are amongst those that have benefited largely from this extension of public interest. The new investor displays a partiality for stocks and shares in companies that he can see at work. Taking the 'bus and tube group as an example, nobody—in London and its sprawling suburbs—can escape its penetrating presence. Electric lighting schemes, the country through, are of insistent and persistent interest. People like to "see their money in front of them," according to the fancy of a great many. The dominant wireless note struck in thousands of homes every night is a recurring reminder of Marconi, and although the past few years have been so unhappy for older purchasers of Marconi shares, the speculative fancy lightly turns towards them as holding promise for future prosperity.

And the "new investor" asks for prospects of capital appreciation, besides security of his money. We find, for instance, the holder of London electricity supply shares looking at these with the slightly dissatisfied air of one in whose investment the chance of improvement in value is but slender. He turns to the shares of the big provincial power supply companies, Midland Counties, Yorkshire, Newcastle-on-Tyne, Lancashire, and the Scottish undertakings. In the good concerns of this class, there is obvious scope for extension. Dividends are of the 6 per cent. to 8 per cent. order; prices stand relatively high, and yields are not liberal. But the investor of to-day foresees the likelihood of more capital being required; therefore, more issues of shares at bonus prices, more chance of profits in this direction than in bumper dividends. The policy of following this line of argument is reasonable: the main uncertainty, mentioned for what it may be worth, is the Government's possible action in the popularisation of electricity. To the ordinary man, the wisdom of using the existing stations, where suitable, would seem too plain for the admission of a doubt.

The County of London final dividend of 5 per cent., on old

and new shares alike (Electrical Review, p. 313), provoked a shade of disappointment in the market, where 6 per cent.—to make 11 per cent. for 1926—had been expected. The price reacted to 26s. 9d. and rallied to 27s. 6d., leaving a loss of 6d. on the week. Metropolitans drooped to the same extent, while Westminsters hardened to 25s. 6d. Midland Counties are 6d. up at 21s. 6d. Yorkshires and South Metropolitan preference regained the dividend deductions made from their prices last week.

The North Metropolitan Electric Power Supply Company seeks Parliamentary sanction to raise its capital by £1,500,000 to £3,500,000, with a corresponding increase in its borrowing powers. The Bill will pass unopposed through the House of Lords. The Company lately offered £850,000 5 per cent. debenture stock, under the Trade Facilities Acts, at 100½, the price of which stands at ¼ discount; fully-paid scrip is quoted 100¼. In its report, issued the other day, the North Metropolitan shows an increase in the number of its customers, of 3 per cent., whose consumption of energy was 6 per cent. greater than that in the 1925 period. The Company's 6 per cent. first preference are quoted 22s., the 8 per cent. second preference stock at 100, and the 5½ per cent. debenture stock at about the same price. London Power 5 per cent. debenture can be bought at 98½, free of stamp and fee, with three months' interest due on April 1st. The yield is £5 1s. 3d. per cent. on the money, and the security stands in the front rank. County of London 7 per cent. debenture is on offer at 107, April and October interest. The stock can be repaid by the Company at 100 any time after 1931, and holders will do well to bear in mind the strong probability of redemption being effected at 100, in a few years' time. Also, there is a sinking fund, now in operation, for repayment at 100.

Piedmont Hydro Electric Company shares were thought to be on the point of introduction to the market, and their advent aroused attention. Advance details showed the Company to have an authorised and issued share capital of 600 million lire, divided into 4,800,000 shares of 125 lire each. The undertaking is stated to comprise over 40 hydro-electric power companies and telephone companies, the latter operating about 50 per cent. of the telephone services of Italy, under agreement with the Italian Government. For the three years 1922-1924 inclusive, annual dividends of 8 per cent. were paid. In 1925 the dividend was 9 per cent., and in 1926 9.60 per cent. Caution will recognise the speculative element that must attach to any industrial company working in Italy. Some hitch is said to have occurred in the negotiations, and the issue may be postponed for a time.

Mexican Utility issues remain in request, and a rise of 5 points brought the Light and Power preferred shares to 97½. The Company is expected to deal with the arrears of dividend on these shares, accumulated since October, 1913, by the allotment of a new stock carrying 4 per cent. interest. Nothing definite is known on the point, but an official statement is looked for in March. Other Mexicans are firming up. Anglo-Argentine Tramways preferences have improved, and Brazilian Tractions went ahead with a rise of 3½ points. On the other hand, British Columbia issues further reacted, the deferred and preferred being 3 and 2 down respectively. There is no fresh movement in the London tramways' prices. The reports of the companies are out, and the Metropolitan Electric Tramways have declined to renew their lease in 1930 unless the competition from omnibuses is restricted.

Lord Ashfield has promised to deal with the question of unifying London transport when he addresses the Underground Electric Railways of London meeting on March 15th. His speech is awaited with keen curiosity and interest. He foreshadowed a substantial raising of new money for the London General Omnibus Company. Last year, said Lord Ashfield, was a good one, but this year should be a better. Districts, Central Londons, Metropolitans, are all higher. The Underground £1 shares have advanced to 15s. 6d., at which the current yield on the money is £1 18s. 9d. per cent. The Southern Railway, according to a statement made in the House of Commons last week, is so satisfied with the electrification of the Company's London suburban lines, that it is anxious to proceed with further extensions.

United River Plate Telephone shares are 10s. up at 8½, the demand being pressing. Automatic Telephones lost a trifle at 53s. 6d., and International deferred sagged to 40s. 6d. The shrinkage in the price of the latter is arousing some little uneasiness in the minds of people who bought at several shillings above the present price, when speculation was active in the shares. It is now thought that the dividend will be 10 per cent., or possibly rather more. Cable stocks and shares have not changed in price for a week.

Johnson & Phillips gave way abruptly to 55s. 6d.; a subsequent rally to 56s. 3d. has left the price 2s. 6d. down on balance. Small losses occurred in British Insulated, English Electric, and General Electric. Henleys are easier at 89s. 3d., but the preference at 4½ have regained the dividend taken off the price a week ago. Iron, steel, and engineering shares display a harder disposition. The rubber share market is bracing up; the raw produce looks firmer, and there is not much floating supply of shares to satisfy the mild inquiry of the past few days. Speculation does not exercise a great deal of discrimination nowadays if it sees a possible chance of a rise, but a general advance in rubber shares at the present time might easily prove to be premature. In wireless shares, Marconis are 1/16th up at 16s. 3d., and Canadians at 3s. 10½d. have gained a few halfpennies.

Share List of Electrical Companies.

	Nom.	Dividend. 1924.	Dividend. 1925.	Price Feb. 28 1927.	Rise or fall.	Yield p.c.
Home Electricity Companies.						
Bournemouth and Poole	£ 1	14	14	60/9	—	4 12 0
Brompton Ordinary	1	10	10	25/-	—	5 12 0
Charing Cross Ordinary	1	15	15	25/6	—	5 9 10
do. do. 4½ Pref.	1	4½	4½	17/-	—	5 6 0
Chelsea	1	12	12	25/-	—	5 12 0
City of London	1	15	15	2½	—	... ...
do. do. 6% Pref.	1	6	6	23/-	—	5 4 4
Clyde Valley	1	8	8	29/6	—	5 8 4
County of London	1	15	15	27/6	—6d	5 1 10
do. do. 6% Pref.	1	6	6	23/-	—	5 4 4
Edmundson's Ordinary	1	7	8	26/3	—	6 2 0
do. 7% Pref.	1	6	7	23/-	—	6 1 9
Elec. Supply Corporation	1	10	10	30/6	—	6 11 9
Kensington Ordinary	1	15	15	24/6	—	5 14 8
Lancs. Light and Power	1	7½	7½	24/-	—	6 2 6
London Electric	1	10	10	24/-	—	5 17 8
do. do. 6% Pref.	5	6	6	5⅞	—	5 10 4
Metropolitan	1	11	11	25/6	—6d	5 9 10
do. 4½% Pref.	1	4½	4½	17/-	—	5 2 10
Midland Counties	1	5½	6	21/6	+6d	5 14 8
Newcastle-on-Tyne Ordinary	1	7	7	21/3	—	6 11 0
do. 5% Pref.	1	5	5	17/6	—	5 14 3
do. 7% Pref.	1	7	7	24/-	—	5 16 8
Notting Hill 6% Pref.	10	6	6	10	—	6 0 0
North Met. Elec. 6% Pref.	1	6	6	23/-	—	5 9 1
St. James' and Pall Mall	5	17½	17½	25/-	—	5 12 0
South London	1	15	15	24/6	—	6 2 0
South Metropolitan Pref.	1	7	7	1¼ xd	+6d	6 8 0
Urban Ordinary	1	4	7	25/-	+6d	5 12 0
do. 6% Pref.	1	6	6	20/6	—	5 17 1
Westminster Ordinary	1	15	15	25/6	+6d	5 12 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	30/9	—	7 8 2
Yorkshire Elec.	1	8	8	29/6xd	+9d	5 8 4
Home Rails.						
Central London Ord. Assented	Stock	4	4	70 xd	+½	5 14 4
Metropolitan	,,	6	6	63½ xd	+15/-	4 14 6
do. District	,,	8½	8½	59½	—	5 18 8
Underground Electric	£1	Nil	Nil	15/6	+6d	1 18 9
do. do. Income	Bonds	6	6	104	—	*5 15 5
Telegraphs and Telephones.						
Anglo-Am. Tel. Pref.	Stock	6	6	100	—	6 0 0
do. Def.	,,	1½	1½	24	—	6 5 0
Automatic Telephone	1	8	18	53/3	—6d	6 15 3
Chili Telephone	5	5	6	6½	—	4 12 4
Cuba Sub. Ord.	10	5	5	7	—	7 5 6
Eastern Extension	10	10	10	17½	—	*5 13 4
Eastern Tel. Ord.	Stock	10	10	172½	—	*5 16 0
Globe Tel. and T. Ord.	10	10	10	18½	—	*5 6 8
do. do. Pref.	10	6	6	11	—	5 9 1
Great Northern Tel.	10	22	20	26½	—	7 10 0
Indo-European	25	9½	10	46½	—	*5 7 6
Marconi	1	10	Nil	16/3	+1/8	... ...
Marconi-Marine	1	10	7½	1½	—	6 13 4
Oriental Telephone Ord.	1	12	12	2½	—	*5 1 1
United R. Plate Tel.	5	8	8	8½	+½	*4 10 2
Western Telegraph	10	10	10	17	—	*5 17 8
Home and Foreign Trams, &c.						
Anglo-Arg. Trams First Pref.	5	5½	5½	3½	+⅛	8 16 0
do. do. 2nd Pref.	5	6	6	3⅛	+1/16	9 16 0
do. do. 5% Deb.	Stock	5	5	71½	—	7 0 0
British Electric Traction Ord.	,,	7	8	145½	—	5 10 0
do. do. 6% Pref.	,,	6	6	109	—	5 10 1
Brazil Traction	100	4	5	124½	+3½	4 18 5
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	89½	—	5 11 9
do. do. Preferred	,,	96/-	136/9	120½	—3	*5 3 9
do. do. Deferred	,,	129/5	8	157½	—3	*5 2 6
do. do. Deb.	,,	4½	4½	81½	—	5 4 4
London & Sub. Trac. 5% Pref.	1	2½	Nil	6/6	—	Nil
London United Tram. Deb.	Stock	4	4	49½	—	8 1 8
Mexico Trams, 5% Bonds	—	5	5	69½	+2	7 4 0
Mexican Light Common	100	Nil	Nil	42	—	Nil
do. Pref.	100	Nil	Nil	97½	+5	Nil
do. 1st Bonds	—	5	5	70½	—	7 1 10
Yorkshire (West Riding)	1	6	—	10/-	—	... ...
Manufacturing Companies.						
Babcock & Wilcox	1	12	18	52/6	—	4 19 1
British Aluminium Ord.	1	5	10	46/3	—	4 6 7
British Elec. Transformer Pref.	1	Nil	7	18/3	—	7 13 8
British Insulated Ord.	1	15	15	68/9	- 3d	4 7 3
Brush Ord.	1	10	10	28/3	—	7 1 7
Callenders	1	15	15	8½	—	4 5 9
do. 6½% Pref.	1	6½	6½	23/9	—	5 9 6
Crompton Ord.	1	Nil	Nil	10/-	—	... ...
Edison-Swan	£/-	10	10	10/-	—	4 0 0
do. 5% Deb.	Stock	5	5	84	—	5 12 1
Electric Construction	1	10	10	31/3	—	6 8 0
Enfield Cable Pref.	1	7½	7½	1½	—	6 6 6
English Electric	1	5	Nil	14/6	- 6d	... ...
do. do. Pref.	1	6	6	17/6	—	6 17 1
Gen. Elec. Pref.	1	6½	6½	23/6	—	5 10 8
do. Ord.	1	5	7½	31/-	—6d	4 16 9
Henley	1	14	20	89/3	—9d	4 9 8
do. 4½% Pref.	5	4½	4½	4½ xd	+2/-	5 6 0
India-Rubber	1	5	5	1	—	*5 0 0
Johnson & Phillips	1	10	17½	2⅛	—⅛	6 4 7
Met.-Vickers Ord.	1	8	8	28/3	—	5 13 3
do. Pref.	5	8	8	2⅛	—	6 18 4
Siemens Ord.	1	7½	7½	29/6	—	5 1 8
Telegraph Construction	12	20	10	29½	—	*4 0 8

* Dividends paid free of Income Tax.

The British Industries Fair.—III.

Functions and Exhibits at London and Birmingham.

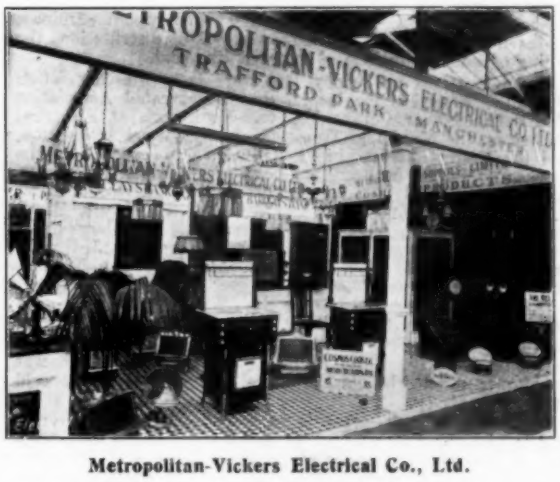
THE heavy section of the British Industries Fair at Castle Bromwich, Birmingham, opened under the most auspicious circumstances, and on a note of optimism. The attendance of buyers from overseas, and also from this country, has been in excess of former years from the first week of the Fair, and the authorities issued an official statement on Saturday last to the effect that the buyers up to the previous night had numbered approximately 31,000. In very many instances buyers spent two and three days at the Fair. It was also officially estimated that the value of the business actually done during the first five days of the Fair was one and a half million pounds, whilst the number of business inquiries from all parts of the world, and particularly from the Dominions, was substantially in excess of those in previous years. It was pointed out that a good deal of business was re-opened with small far-away countries, from which, in a commercial sense, very little has been heard for several years. Another point of interest is that Australia, and some parts of South America, are buying on bulk lines, and this tendency is also a little more noticeable with regard to India, although it is still to a large extent what the export merchants describe as a "cheap market." On Saturday, there was a huge attendance of employés from all parts of the Midlands. The six miles of avenues were crowded in the afternoon, when over 30,000 persons were in the exhibition at one time.

Chloride Electrical Storage Co., Ltd.

The British Thomson-Houston Co. Ltd.
ELECTRICAL ENGINEERS & MANUFACTURERS
The British Thomson-Houston Co. Ltd.
ELECTRICAL ENGINEERS & MANUFACTURERS

British Thomson-Houston Co., Ltd.

General Electric Co., Ltd.



Metropolitan-Vickers Electrical Co., Ltd.

Four Electrical Stands at Birmingham.

The number of official delegations of trade and professional organisations has been larger than on any previous occasion, and every day last week from six to ten societies were entertained by the Council of the Fair at luncheon, and during the current week a similar programme will be gone through. There is no doubt that the visit of the Prince of Wales on Tuesday last week gave a very great impetus to the Fair, and the presence on the same day of Lord Mayors, Lord Provosts and Mayors of industrial towns also had a good influence in a similar way. The Lord Mayor of London, with the

Sheriffs of London, intimated their intention to pay a visit in civic state to the Fair on Wednesday this week. Wednesday last week was exporters' day, and other delegations then present were the members of the Consular Association of Birmingham, the Metal Thread Screw Manufacturers' Association, and the National Hardware Association. Mr. Stanley Baldwin, the Premier, had a most enthusiastic reception on Thursday last, and in company with Mr. L. S. Amery, Colonial Secretary, and the leading officials of the Department of Overseas Trade, made an extensive tour of the Fair. The Prime Minister described the heavy section of the Fair as an unqualified success, and declared that there could be no more convenient place for such a movement than Birmingham, which was in the heart of the country, and accessible from all parts.

On Thursday, the visitors included the Ironmongers' Federated Association, the British Commercial Gas Salesmen, and the British Society of Gas Undertakings. Having regard to the fact that the electrical industries' display is by far the biggest ever seen in the provinces, it is not surprising that there should have been a record attendance of electrical men. From Friday to Monday, no fewer than 16 electrical delegations attended, and others were expected yesterday (Thursday). These bodies included, of course, the Institution of Electrical Engineers, the Wholesalers' and Contractors' Associations, tramway engineers, and civil engineers. Substantial business for shipment has been done by the electrical manufacturers, particularly in the direction of power plant for Australia, New Zealand, India, and South Africa.

We reproduce on p. 359 photographs of the stands of four leading electrical companies, and below we give brief reports of the proceedings at some of the luncheons held at Birmingham.

The London Section at the White City also reports good business. An official report recorded an average daily attendance last week of 1,200, with the exception of Saturday, when there was an influx of over 18,000, more than half being members of the public. Foreign buyer-visitors last week numbered about 1,500; Germany, the United States and Holland were very well represented, and the Dominions also sent many buyers.

THE BIRMINGHAM SECTION.

As mentioned previously, the principal guest at a luncheon given at Castle Bromwich on Thursday last week was the Prime Minister, who was accompanied by Mr. L. S. Amery, Colonial Secretary, Mr. A. M. Samuel, Parliamentary Secretary to the Department of Overseas Trade, and Sir Wm Clarke, Comptroller of the Department.

The toast of "His Majesty's Government" was submitted, in a brief speech, by Mr. Gilbert Vyle, president of the Association of British Chambers of Commerce, who said that he thought that the Premier would be convinced as a result of his tour of the Fair that British manufacturers were progressive and endeavoured to adapt themselves to present-day needs of British and foreign consumers.

Replying to the toast, the Prime Minister pronounced the Fair to be an unqualified success. He paid a tribute to the courage and foresight of British business men, and touched on the evidence which the Fair afforded of a new co-operative spirit in industry, marking a departure from the old English habit of secrecy and reserve. The other thing which interested him was the amount of space devoted to lighting and heating. The solution of the coal problem would undoubtedly come when the electrical people, the gas people, and the makers of stoves and modern fireplaces could bring into every cottage in the country, or every cottage within reach of gas or electricity, the means of cheap and clean heating which would eliminate the need for that most expensive method of distribution, the selling of small quantities of material like coal.

The delegations on Friday last were from the Association of Mining Electrical Engineers, the Incorporated Association of Electric Power Companies, the Institution of Electrical Engineers, the Municipal Tramway and Transport Association, and the Tramways and Light Railways Association. At the luncheon, Mr. R. A. Chattock, city electrical engineer, Birmingham, presided, and among those present were Mr. Roger T. Smith, Dr. A. H. Railing, Col. W. T. Kent, Messrs. H. H. Berry, D. Martin, Theodore Stretton, G. M. Harvey, F. Austen, C. Spencer, R. P. Sloan, J. T. H. Legge, W. J. Binnie, and A. H. Dykes, Ald. J. Bowes, Ald. Sir John Timson, and Mr. R. L. Horsfield.

The Chairman, apologising for the absence of Dr. Ferranti, who was indisposed, expressed the hope that the visit of the various representatives of the electrical industry would be profitable to them and would demonstrate that there was no intention that the old country should be left in the cold in the future.

Dr. A. H. Railing, proposing the toast of "The Visitors," said to him the Fair was full of indication that the industrialists of the country possessed common sense and intuition. Many of them had been to the exhibitions of Paris, Brussels, Dusseldorf, Leipzig, and Lyons, and had seen more spectacular displays, but what struck him as an engineer and manufacturer most forcibly in the Fair was that there was very little commonplace in it, that each piece of apparatus represented a deliberate pressing forward in speciality work, and not done haphazardly any more like of old. They wanted to see that those who had the direction of supply companies, manufacturing companies, and mines did not provide just for tomorrow, but for a long period ahead. They wanted supply companies and consulting engineers to realise that they must waive their personal opinions on minor matters to enable the manufacturers to get out of the manufacture of specialities in order to enable them to manufacture standardised articles on quantity production lines. The mine-owners must realise that they had to raise money for modern electrical equipment or else go under. Electrical manufacturers must go in for research so as to be pioneers, not imitators, and the big supply companies must assist those concerns who undertook pioneer work. He thought that it was necessary for the horse-power per man in this country's factories and mines and means of transport to be trebled or quadrupled to be comparative with some other countries, and that was the only way largely to increase our output per man, and raise his wages, and thereby raise our export possibilities and increase our inland market.

The toast was responded to by Mr. Roger T. Smith, past-president of the Institution of Electrical Engineers.

Mr. T. R. Martin (J. H. Tucker & Co., Ltd.), Chairman of the Management Committee of the Fair, and of the Advisory Committee of the electrical section, presided at a luncheon on Saturday last, when representatives of the Electrical Power Engineers' Association, the Meter Engineers' Technical Association, the National Association of Supervising Electricians, the Birmingham and District Association of the Institution of Civil Engineers, and the Institution of Electrical Engineers (Students' Section) were present.

The Lord Mayor of Birmingham, with whom was the ex-Lord Mayor (Sir Percival Bower) extended a hearty civic welcome to the visitors. The electrical industry, he said, had set up a remarkably high standard, and it was warmly to be commended for its enterprise.

The toast of the "Visitors" was proposed by Mr. R. A. Chattock, who warmly welcomed the numerous body of junior electrical engineers. During the past eight years, the period in which that fair had been held, enormous progress had been made in electrical engineering, and much of the newest equipment was to be found on the stands. The main advantage of the Fair was that it enabled those in the industry to compare one set of apparatus with another, which could not be done in any other way so satisfactorily.

The toast was replied to by Mr. A. W. Crompton (E.P.E.A.), and Mr. G. F. Shotter (M.E.T.A.).

Mr. T. R. Martin presided at another luncheon on Monday, February 28th, at which the following bodies were represented:—The Council of the Birmingham Chamber of Commerce; the Electrical Contractors' Association; the Electrical Contractors' Association of Scotland; the Electrical Wholesalers' Federation; the Illuminating Engineering Society; and the National Register of Electrical Installation Contractors.

The toast of "The Visitors" was proposed by Mr. H. H. Berry, a member of the Fair Management Committee. He referred with satisfaction to the growth of the electrical section, which was instituted last year, and said that they, as manufacturers, desired the co-operation of all the trade organisations to help in the increasing prosperity of the Fair, for its effect upon the British electrical industry, especially in relation to foreign markets, was obvious. They would like the Fair to be looked forward to annually as a great trade effort. Apart from Press publicity, there were two ways of bringing merchandise under the notice of buyers. One was by sending out commercial travellers, and the other by such exhibitions as the Fair. Mr. H. J. Miles (president of the Electrical Contractors' Association) said that the Fair was a business-like display of British products; and Mr. W. Mackintosh (president of the Scottish Electrical Contractors' Association) observed that while the Electricity Bill did not mark the millennium, it would be to the benefit of the industry. He said that he did not think adequate attention was paid to salesmanship; it was the predominant factor in their business. Mr. G. P. Dennis (president of the Electrical Wholesalers' Federation) expressed the opinion that the electrical industry was not fully represented, and urged B.E.A.M.A. to make itself responsible for the electrical section of the Fair in future years to ensure adequate representation.

British Electric Transformer Co., Ltd.

This company's exhibit consists of three separate transformers in various parts of the buildings. One, a 1,000-kVA, 10,500/3,000-V, 3-phase, oil-cooled, core-type transformer (fig. 11), is displayed in the engine house. A 100-kVA, 3-phase, oil-cooled, core-type transformer, with switchgear, is to be seen in actual use supplying power for the exhibition, the power being derived from the Birmingham Corporation's mains. The other, a 33⅓-kVA, single-phase, radial-type, air-cooled transformer, is installed in a kiosk built by the Yorkshire Switchgear and Engineering Co., Ltd. The core-type transformers are of the "Berry" standard pattern, with cores interleaved and split to provide a cooling duct. The framework is of a patented box girder construction which is lighter and stronger than the usual channel steel section. The windings are concentric, mounted on bakelite cylinders, vacuum dried and impregnated. The ends are securely fixed by bakelite end blocks, the h.p. windings being provided with adjustable compression screws. Ample attention has been paid to the cooling of the h.p. windings by means of

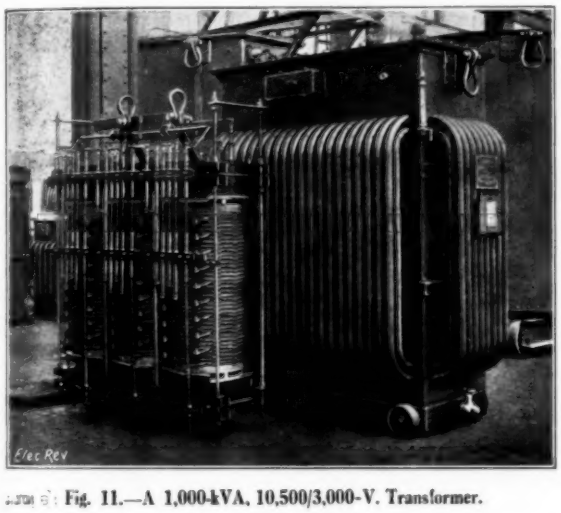


Fig. 11.—A 1,000-kVA, 10,500/3,000-V. Transformer.

vertical ducts through both h.p. and l.p. windings, with the addition of horizontal ducts in the h.p. windings only. The tanks are of the usual boiler-plate construction, with external cooling tubes for the oil. The 100-kVA, three-phase transformer, which is supplying power to the exhibition, is equipped with a special combination of h.p. switch- and fuse-gear made, so far as is possible, "foolproof" against improper use. The apparatus is entirely ironclad, and consists of a three-phase oil-break switch connected in series with three liquid-filled "Empire" fuses. The interlocks on the apparatus ensure that the following cycle of operations is observed, preparatory to the replacement of the fuses should they blow, or should circumstances necessitate the transformer being examined. The oil switch is opened, thus breaking the h.p. circuit; the entire oil switch is then lowered, and insulating barriers are interposed covering all the "live" ends of the cable. The same operation permits of the door of the fuse cubicle being opened, and access gained to the fuses, which are now entirely "dead." Similar operations carried out in the reverse order provide for putting the transformer back on to the supply. The small 33⅓-kVA air-cooled unit is of the original "Berry" radial pattern. It is specially designed for lighting purposes, having a very low open circuit loss with correspondingly good efficiencies at the lower loads. The actual figures are 98.1 and 98.25 per cent. at full and half loads respectively. The primary winding is sandwiched between the two halves of the secondary, giving an impedance value of about 3 per cent., and the secondary is wound in layers direct on under heavy tension. The primary consists of a number of separate coils former wound and assembled on the job. The main insulation used between windings and also iron consists of best-quality micanite gradually formed in position. Insulation between layers consists of linen fabric impregnated in vacuum with special "Berrite" insulating compound.

London Electric Wire Co. & Smiths, Ltd.

Upon this stand is a display of "Lewcos" products, which include silk, cotton, asbestos, covered and enamelled wire and strip of all sizes, as well as various types of wire for specific purposes. Insulating materials and wireless products are also displayed. The last section includes aerial and Litzendraht wire, screened coils, multi-way battery leads, &c.

K.F.M. Engineering Co., Ltd.

This company is a manufacturer of electric and other signs, and a number of these are exhibited on its stand. Some of these are distinctly original in construction and appearance.

Rees Roturbo Manufacturing Co., Ltd.

This company is showing running models of four Rees Roturbo pumps. The first is a boiler-feed pump, driven by a turbine. On this model the pump is carried from the turbine pedestal bearing, thus eliminating the baseplate and making a very compact arrangement. This is a comparatively new model, and although it has not long been on the market, we understand that there has been a good demand for it. The next exhibit is a pump of the "UCV" type, coupled to a Rees-Roturbo motor. This is of the medium lift type, and the casing is split on the centre line, allowing the whole of the internal parts to be readily examined or removed without disturbing the pipe connection. A multi-stage pump coupled to a Rees-Roturbo d.c. motor is shown, and an interesting exhibit is a self-contained pumping set of the "UH" type. This has been designed to meet the demand for a simple and cheap type of pump of moderate capacity. It is very compact, occupying minimum ground space, and very simple in design and construction. It embodies the Rees-Roturbo self-regulating properties with consequent immunity from overload of the driving motor through variation in head and volume when running at constant speed.

Stewarts & Lloyds, Ltd.

The exhibits on this stand comprise wrought iron and steel tubes for the conveyance of gas, water, steam, compressed air, &c., with all the necessary fittings. These tubes, ranging from ⅛ in. to 60 in. bore, are manufactured by the lapwelded, buttwelded, or solid drawn processes, according to size and quality. Of particular interest is the "Victaulic" joint, which is a cheap and efficient means of jointing tubes. The special feature of the joint is a flexible rubber ring on the principle of the "U" washer used by hydraulic engineers.

A. Reyrolle & Co., Ltd.

Substantial design is the keynote of this company's display. The switchgear section includes examples of air-break switches suitable for factories, foundries, ship yards, &c. Double- and triple-pole patterns are shown for currents of 30 and 60 A, and one notable item is a 60-A, triple-pole switch, combined with a 30-A plug and socket. The principal oil-break switch on view is a 60-A gate-end switch with boiler-plate tank (fig. 12). This is fitted with a mechanically-interlocked 60-A, 3-phase and earth pin plug and socket. It is claimed to have received the first "flameproofness" certificate from Sheffield University. A selection of cable boxes is exhibited. Among these are 6,000-V and 660-V, 3-phase dividing boxes with glands and armour clamps; 4-core and 20-core pilot dividing

Fig. 12.—A Reyrolle Gate-end Switch and Plug.

boxes; an up-to-date telephone dividing box; and examples of sealing bells for general purposes. A combination of gear is a 100-A, double-circuit combined switch and fuse panel, a 60-A similar panel, and a 30-A single-circuit fusebox. The board forms one complete floor mounting distribution board, with incoming dividing box and cone gland on the left, extension end plate on the right, and outgoing circuit dividing boxes with universal glands and clamps. It may also be supplied for wall mounting and for use on any combination of circuits up to 500 A. A selection of ironclad distribution boxes is shown. Among these are a 60-A, two-way triple-pole weatherproof fusebox, complete with one incoming and two outgoing dividing boxes, each with universal gland, and a 30-A, four-way, single-pole dustproof fusebox. A demonstration board on the stand bears a number of domestic and industrial plugs and sockets. The industrial plugs shown include a 100-A flameproof combination, a 60-A, 3-phase, weatherproof pattern, vehicle-charging plugs, &c. Another demonstration board displays the company's standard self-aligning porcelain-handled fuses.

Blackstone & Co., Ltd.

Five models of the Blackstone "Spring Injection" cold-starting oil engine are the principal exhibits on this stand, other exhibits being the "Spring Injection" mechanism, the Blackstone combined petrol engine and compressor, a fuel oil filter tank, and Blackstone petrol engines of 4 and 5 b.h.p. The advantages claimed for the "Spring Injection" engine are that it will start from cold on any grade of fuel oil which can be pumped; the fuel is injected mechanically into the combustion chambers at the same point at the end of each compression stroke by a simple device, ignition taking place through the heat of compression in the cylinder; a more prolonged combustion can be obtained, with the result that the engine is not subjected to unnecessarily severe stresses, and the efficiency, both mechanical and thermal, is greatly improved. The fuel consumption per b.h.p.-hour is guaranteed in the single-cylinder sizes, developing 50 b.h.p. upwards, to be only .4 lb. for full and three-quarter load.

Belliss & Morcom, Ltd.

The principal exhibit on this stand is a 750-kW high-pressure steam turbine. This is coupled to a 750-kW alternator by the Lancashire Dynamo & Motor Co., Ltd. It has a speed of 3,000 r.p.m., is adapted for about 180 lb. steam pressure, and any temperature up to 450 deg. F. and 28½ in. vacuum. The diaphragms are rolled steel, fitted with standard brass blades throughout. For high temperatures the casing would be of steel and the high-pressure blades of Monel or stainless steel depending on the conditions. Both wheel and diaphragm constructions are illustrated by separate exhibits. The turbine has the standard governor gear for turbines of the size, the governor box at the end containing the oil relay mechanism. Another important exhibit is a Belliss "V" type enclosed compound high-speed engine, with forced lubrication. This is designed to develop 290 b.h.p. at a speed of 425 r.p.m., and will withstand a 25 per cent. overload. The slide valves are arranged between the steam cylinders, the centre lines radiating from the shaft centre in V form. The valve chests being so disposed, the necessity for outside receiver pipes is avoided. All bearings, including the joints of the governor, are lubricated with oil under pressure. The front doors are removed to show the working parts and the forced lubrication system, the engine being rotated at a speed of 25 revolutions per minute by means of a 3-b.h.p. motor supplied by the Crypto Electrical Co., operating through a Wallwork worm gear and a Hans Renold chain drive.

The 750-kW alternator made by the Lancashire Dynamo and Motor Co., Ltd., used with the steam turbine, is of the "Lancashire" turbo type with direct-coupled exciter. It has an output of 937 kVA at 5,000/5,500 V, with a power factor of 0.8. It is arranged for closed air circuit cooling, and with thermo-electric detector for recording the temperature at the switchboard. A separate exhibit is the "Arca" regulator, manufactured by British Arca Regulators, Ltd.

Kelvin, Bottomley & Baird, Ltd.

The principal exhibit on this stand is the "K.B.B." quartz mercury-vapour lamp, designed for scientific, medical and commercial application. The feature of this lamp is that the quartz envelope is not exhausted, the arc working at atmospheric pressure. Another feature is the slow rate of decrease of the ultra-violet output with usage, and the richness of the rays. The "K.B.B." "Pneumercator" distant boiler-water gauge, which is exhibited, can be placed in the best position for observation below, above, or at any reasonable distance from the steam drum, and as it is charged with cold water when in operation, the life of the gauge glass is considerably prolonged. It enables the water gauge to take its place amongst other boiler control instruments at a level which admits of constant and convenient observation. The "K.B.B." "Econometer" CO_2 tester is an instrument for analysing flue gases for CO_2. Of robust construction, it is charged with dry absorbents and gives high accuracy without the use of laboratory glassware, glass cocks, &c. There are no delicate parts, and no skilled adjustment is necessary. An interesting exhibit is the "Macbeth" artificial daylight lamp. The transmission filters used in this lamp are spectrographically tested, and their efficiency as a substitute for daylight has been certified by the N.P.L. Other exhibits on the stand include the "Pneumercator" tank-gauge, which provides a means for indicating at a distance the height, weight of volume of liquids in tanks; the "K.B.B." smoke warning and fume indicator, a simple device that renders the condition of the uptake gases visible at all times; the "K.B.B." vibrometer, providing a ready means for the detection and investigation of vibration; the "K.B.B." thermo-electric pyrometer; and samples of transparent fused quartz.

Hunt & Mitton, Ltd.

This firm is showing a representative selection of its steam fittings, boiler mountings, lubricators, &c., and also steel valves in all sizes from 14 in. downwards. The principal feature is a 12-in. "Supertite" cast-steel parallel slide valve, of massive pattern, for working pressures up to 450 lb. per sq. in. This is fitted with the Dean system of electric control for easy opening and closing. Developments in small stamped steel valves are shown, as well as samples of "Nickloy," a metal compound for valve faces under superheated steam.

National Gas Engine Co., Ltd.

This company displays examples of its "CS" type, 31-b.h.p., horizontal oil engine, a "CX" type, 66-h.p., horizontal oil engine, a "5V" town's-gas engine, a "National-Wallwin," non-chokeable pump, and a "10V" town's-gas engine and dynamo. The type "CS" is of massive construction, and designed to operation with a low consumption of fuel and lubricating oil; the special fuel pump and atomiser secure effective consumption at all loads. The atomiser passes through the water jacket to the combustion chamber, the entire surface of which is water cooled. Oil tanks and sprayers are provided for the use of light and heavy oils, the heavy-oil tank being arranged in conjunction with a strainer and heater attached to the exhaust pipe of the engine. The "National" "5V" and "10V" gas engines are fitted with a centrifugal governor of the latest type, which reduces friction to a minimum and controls the engine in an efficient manner. An arrangement is fitted so that slight speed adjustments may be made while the engine is running. A special mixing valve, entirely automatic in operation, gives the correct mixture of air and gas at all loads.

Record Electrical Co., Ltd.

This company exhibits a complete range of switchboard and portable measuring instruments, also automatic battery cut-in and cut-out switches for accumulators, automatic circuit breakers for power circuits, and electrical tachometers. There is a range of moving iron and moving coil "Cirscale" instruments, suitable for a.c. and d.c., respectively. These are provided with circular scales and a pointer which deflects through an arc of approximately 300 deg. This deflection is obtained entirely without gearing. For the mains engineer and electrical inspector, the new change coil test set for a.c. or d.c. will have a special interest. This set covers a very wide range from 0/1 amp., up to 600 amps., 0/6 volts up to 750 volts. There are no weighty accessories, such as shunts or transformers, which is an advantage. Among the newest developments is shown a range of skeleton instruments fitted in glass cases with transparent scales, so that readings may be observed from either side. These are for demonstration purposes in technical schools and colleges.

Vickers-Petters, Ltd.

This company, which has just changed its name to Petters (Ipswich), Ltd., is showing two types of heavy-oil engine, a "Petter-Light" set, and three other engines. Four of the exhibits are shown under working conditions. The Petter "C" type heavy-oil engine is a development of the hot-bulb semi-Diesel type, and has been developed to meet the need for an engine to give Diesel-like economy in fuel and lubricating oil combined with simplicity. It has a medium compression, and the cylinder head and combustion chamber are completely water-cooled. Ignition is effected solely by the heat of compression, no "hot-bulb" or other device being used.

Falkirk Iron Co., Ltd.

The principal exhibit of this company is, as last year, the "Falco" electric iron, several types of which are displayed. In addition, it is showing three models of the "Falco Livecoal" electric fire. These fires are designed to give an appearance of a live coal fire, the effect being helped by the manner in which the fire itself is raised from the floor in the old English style. One of the fires is a "period" rustless steel dog grate, the other two being of smaller, less expensive, sizes.

Harcourts, Ltd.

The principal exhibit on this stand is a process for depositing unstainable chromium on metal articles, called "Perchromia." This leaves the deposit glass-hard, and enables it to withstand attack from all household acids and salts. It does not tarnish in foggy or sulphurous atmospheres.

Ruston & Hornsby, Ltd.

The feature of this exhibit is a running model of the Ruston cold-starting horizontal oil engine, of the "Mark 13H," 130-b.h.p. type. This engine is made in sizes varying from 16 to 340 b.h.p., and the special claims made for it are low fuel consumption, low maintenance costs, continuous operation over long periods, ease of handling, and the ability to start from cold under any conditions. Another running exhibit is a Ruston two-stage air compressor, as used for charging self-starter air receivers, and the stationary exhibits include a 3-cylinder vertical oil engine of 57 b.h.p. and a Ruston patent "Thermax" boiler.

Batteries, Ltd.

The exhibit of this company consists of "Nife" batteries of the nickel-iron-alkaline type, which are specially suited to both light and heavy industrial purposes, as well as wireless and domestic uses. The principal point claimed in this type of battery is that it contains no lead or acid, but uses instead steel plates in a steel-preserving alkaline solution. On account of these elements the "Nife" battery has a number of advantages. There can be no sulphation or corrosion, no self-discharge or acid fumes, the battery can remain idle for an indefinite period, and it has a very long life and a high reliability factor.

Ward & Goldstone, Ltd.

The main feature of this exhibit is a comprehensive range of insulated wires, cables and flexibles for the electrical and automobile industries, and the ordinary range of commercial wires used for heating, power, and so on. The range of insulated flexible wires and cables for general electrical purposes covers every requirement, both in the quality of insulation and the style of finish, and embraces such specialities as "Negrolac," "Feroflex" and anti-shock flexibles. "Negrolac," a glossy black varnished cable, has been introduced especially to meet a demand for a cable of great flexibility, oil- and waterproof, and capable of withstanding extreme climatic conditions. A representative range of bell wires, telephone wires, and multi-telephone cables is included in the exhibit, as also are instrument wires with cotton, silk and enamel coverings. A range of some interest is the "Astra" and "Litz" special multi-stranded wire for plug-in inductance coils and transformers. In addition, there are being shown one or two models of high-tension battery eliminators for a.c. and d.c. circuits, and samples of battery-charging devices.

With the installation of a set of hydraulic presses at their factory, Messrs. Ward & Goldstone are now in a position to furnish large and small mouldings, and they are exhibiting a full range of these. A feature of the mouldings is that various colours with heat-resisting properties can be supplied.

Telegraph Construction and Maintenance Co., Ltd.

The exhibits on this stand, which are mainly the products of the Gutta-Percha Company, comprise two distinct sections. The first consists of special magnetic alloys. These have been named "Mumetal" and "Rhometal." "Mumetal" is characterised by its high magnetic permeability in very weak fields. It is in the form of fine wire, and has been successfully used for the inductive loading of high-speed submarine telegraph cables. In this respect it is interesting to note that section of the Pacific cable from Bamfield to Fanning Island, the longest single length of submarine telegraph cable in the world, was loaded with "Mumetal" wire, as the result of which the new cable can transmit signals at six times the rate of the old cable. In addition to this type of application, "Mumetal" has been used with success in current transformers. For certain requirements, however, the permeability of "Mumetal" is too high, and to meet these requirements "Rhometal" was produced. This alloy is characterised by its high electrical resistance, which is of the order of 100 microhms per cm. cube. Its permeability in fields tending to zero is of the order of 1,000. The second section consists of an electrical resistance alloy named "Pyromic," which contains no carbon, manganese, silicon or aluminium. It is a ternary alloy prepared in h.p. electric furnaces, and is manufactured in the form of wire, ribbon and tape. Also exhibited on the stand are three electric radiators, made by the British Electric Transformer Co., Ltd. These are wound with "Pyromic" resistance wire and tape.

Fielding & Platt, Ltd.

This company exhibits examples of its latest type semi-Diesel oil engine. These have been designed for use with fuel suitable for Diesel engines, but with less capital outlay, and they are specially suitable for dynamo driving, being quickly started and giving steady running, the cyclical variation being within very fine limits. The engine works on the four-stroke cycle of operation, and the oil injector is fitted with a cut-off valve which is controlled by the governor, so that the oil is cut off earlier or later in the stroke, according to the load on the engine. The combustion chamber is of patent design, and its action, in conjunction with the method of spraying the oil into it, ensures complete combustion.

Mouldensite, Ltd.

This company, which is associated with the Damard Lacquer Co., Ltd., Redmanol, Ltd., and the Bakelite Corporation of Great Britain, Ltd., is exhibiting samples of phenolic condensation products. These include moulding powders of various grades and colours, together with mouldings made from these, synthetic resins, varnishes, cements, and also laminated material in black and brown for electrical and radio work, punching, gears, &c.

Coventry Electrical Accessories, Ltd.

This company is showing its "Patent Point" electric iron, the particular feature of which is the special material inserted in the nose of the iron, enabling it to be used for at least half-an-hour after the current has been switched on for five minutes or so. The following appliances are also displayed: The "Ceal" electric iron, the "Wonder" iron, a grill toaster, an electric kettle, and a bowl fire.

British Vacuum Cleaner and Engineering Co., Ltd.

One of the most interesting of the exhibits on this stand is the "BVC." electric vacuum cleaner, which is the company's latest production. It is made in four sizes and is guaranteed against flaws or mechanical or workmanship defects for 12 months. Other exhibits are non-electric vacuum cleaners, in which line the company has specialised for many years.

The Steam Power Section.

An innovation in this year's Fair is a section devoted wholly to steam power plant and equipment. There are five large stands, three of which are equipped with boiler plant, while the other two show generating plant and auxiliaries. We have already dealt separately with a number of the components of this exhibit under the name of the responsible companies, but the following is a brief description of the arrangements. One stand bears a complete pulverised fuel installation (not working) consisting of an "Atritor" pulverising unit (Alfred Herbert & Co., Ltd.) fed by an Avery 2-cwt. automatic coal scale. The pulveriser is capable of dealing with 500 lb. per hour normal rating. The supply from the pulveriser is dealt with by a furnace embodying a flat double suspended arch (Liptak Furnace Arches, Ltd.) and air-cooled side walls. The boiler is one made by John Thompson Water Tube Boilers, Ltd., with a heating surface of 500 sq. ft. and a working pressure of 300 lb. per sq. in.; it is fitted with an integral-type superheater and fuel economiser, the latter being a product of the Clay Cross Co., Ltd. There are two boiler-feed pumps and a rapid feed-water heater by Frank Pearn & Co., Ltd., and the boiler is also equipped with soot-blowing apparatus by the British Soot Blower Co., Ltd. A "Sirocco" induced-draught fan and flue dust collector also form part of the installation. The instruments include steam flow and pressure indicators, CO_2 recorders, &c., by the Electroflo Meter Co., Ltd.; a Cope's automatic feed water regulator (Jas. Gordon & Co., Ltd.); a Kent boiler-level indicator; draught gauges, CO_2 recorders, temperature indicators, &c., by the Cambridge Instrument Co., Ltd.; and various indicators by Negretti & Zambra.

Another boiler installation which has been erected in the section comprises a John Thompson Lancashire boiler fitted with a mechanical stoker, made by the Crosthwaite Engineering & Furnace Co., Ltd. The stoker is fed by an Avery 2-cwt. automatic coal scale. The auxiliaries include a sectional superheater supplied by James Gordon & Co., Ltd.; flue-cleaning and soot-blowing apparatus by the British Soot Blower Co., Ltd.; an induced-draught fan by Musgrave and Co., Ltd.; water-softening plant made by the Paterson Engineering Co., Ltd.; a Lea "V" notch boiler feed meter; a Venturi recording water meter and a boiler load indicator (George Kent & Co., Ltd.); a Rees-Roturbo boiler feed pump; and an automatic feed-water regulator made by the Drayton Regulator & Instrument Co., Ltd.

One of the "engine-room" stands bears a Belliss & Morcom steam turbine, direct-coupled to a 750-kW Lancashire alternator. Near this set is a "Visco" water cooling tower and examples of "Visco" air filters. The tower is equipped with a Rees-Roturbo circulating pump. On the same stand is a 1,000-kVA transformer made by the British Electric Transformer Co., Ltd. There are also examples of "Cambridge" instruments on view. The *pièce de resistance* of the other "engine-room" stand is a compound steam engine direct-coupled to a 100-kW generator, by W. H. Allen, Sons & Co., Ltd. A steam meter supplied by Industrial Combustion Engineers, Ltd., is also shown. The last stand is devoted to an oil-fired vertical "Cochran" boiler, with a feed-water pump by G. & J. Weir, Ltd., and a temperature and pressure regulator by the Drayton Regulator & Instrument Co., Ltd.

Most of the exhibitors in this section also have stands near the section or in other parts of the building.

L. Gardner & Sons, Ltd.

This company is exhibiting a "12H.F." heavy-oil engine (65/69 b.h.p.), a "6H.F." heavy-oil engine (17/19 b.h.p.), a "4T6" heavy-oil engine (96 b.h.p.), and an "OVC" compressing set. The two "H.F." engines are of the horizontal (cold-starting) type, and the "4T6" is of the vertical 4-cylinder type, all these being constructed along recognised lines. The "OVC" is a combined engine and compressor, and its primary object is the initial charging of the air receivers for Gardner heavy-oil engines after installation of the main engine, or in cases where the pressure in the receiver has been lost.

Tangyes, Ltd.

Working models of a 47-b.h.p. heavy-oil engine (cold-starting type) and the "O.W.E.1" oil engine, lamp-starting type for electric lighting purposes are the principal exhibits of this company. The latter engine works on the four-stroke cycle, and has been developed to meet the demand for a small engine using lower compression and initial pressures than is possible with the cold-starting type, thus reducing the pressure on the various working parts. Other exhibits include Tangye centrifugal pumps, a vertical triple-ram pump, and a series of newly designed vertical single-ram pumps, a six-stage turbine pump, a horizontal duplex boiler feeder, a 40-ton hydraulic experimental press, and a selection of various types of pulley blocks, lifting jacks, &c.

Wolseley Sheep Shearing Machine Co., Ltd.

The exhibits of electrical interest on this stand are the electric lighting sets for farm and country residences and the electric sheep shearing and horse-clipping machines. The generating sets are made in four sizes, ranging from 1 to 3 kW. They all include a vertical single-cylinder petrol-paraffin engine, and the dynamo is arranged for belt or geared drive. The equipment is completed by a suitable accumulator battery and switchboard.

THE LONDON SECTION.

On passing through the Wood Lane entrance to the White City the trader cannot fail to admire the series of exhibits of Empire products and foodstuffs; it is indeed an object lesson on how such stands should be dressed, and the general scheme is considerably enhanced by the electric lighting scheme which has been admirably executed.

In the China and Glass Section of the Fair Mr. W. Moorcroft has some attractive pottery in the form of decorative table-lighting ware on view, whilst the Stourbridge Glass Co., Ltd., exhibits bowls and vases in the shape of table lamps of handsome appearance; illuminating glassware is also exhibited by John Walsh, Walsh, Ltd., and Thomas Webb and Corbett, Ltd.

Artistic Lamp Shades.

On several stands decorative electric lamp and candle shades are displayed, made of different materials in numerous styles: amongst them are the Artistic Shade Co. (hand-painted and washable), C. & O. Goring (vellum and parchment), J. M. Joseph (hand-painted silk), F. Parks, Ltd. (silk, parchment and vellum; painted wood table and standard lamps), Waite & Son (silk and linen), Wickins Durable Lamp Shade Co. (silk).

Electric Toys.

In the Toy Section of the Show several exhibitors use electric motors for imparting movement to objects displayed, and amongst the large selection of Meccano, Ltd., are toy electric motors and a large well-made model of a 3-rail railway system.

Ross, Ltd.

In addition to photographic and optical apparatus, a recently-introduced school and home kinema projector is shown; it is a portable outfit (fig. 13) weighing about 90 lb., and the illuminant consists of a 30-volt, 10-ampere filament lamp, and the light is concentrated upon the film by means of a double condenser and mirror at the back of the lamp. Before reaching the film the light passes through a water bath about 3 in. thick, which extracts the heat from the light rays so that the film may remain stationary in the gate aperture for a reasonable length of time without danger of catching fire.

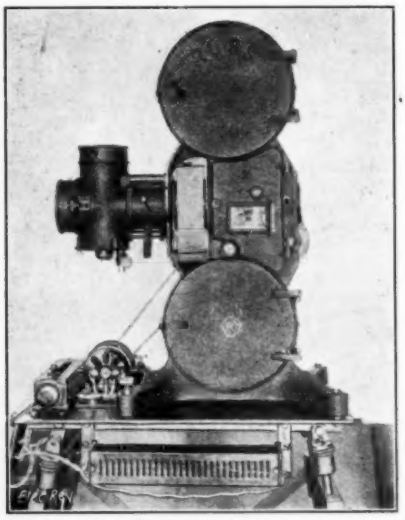


Fig. 13.—Ross Home and School Kinema Outfit.

The machine is substantially built; the main casting is of aluminium, as are also the lamphouse and condenser mount; the mechanism is mainly gunmetal and steel. A universal motor for use on alternating or direct current is provided, with the necessary voltage reduction resistance; a 3-in. lens will give a picture about 8 ft. by 6 ft., and standard films are used. The type of projector fitted in some of the largest London kinema theatres is also on view, the favourite being one provided with a "searchlight" arc lamp.

Watmel Wireless Co.

Besides screened coils, amongst the components displayed is a h.f. choke, the winding of which on an ebonite tube appears to be of a duolateral type in four sections, each bank spaced from the next, and all four in the form of a continuous winding. It is claimed that this type of winding cuts down the self-capacity, though the inductance is also reduced to some extent. The winding is mounted vertically in a celluloid tube on an ebonite base, provided with terminals and tags. In addition to a low-frequency auto-choke coupling, the firm has placed on the market a plain tapped l.f. choke, which is similar, with the exception that no coupling condenser and grid leak are incorporated. The winding is connected to three terminals giving three combinations, so that the value of the choke may be adjusted to suit any particular valve.

New London Electron Works, Ltd.

Among the radio receiving sets on view is the 5-valve model with three condensers in line with single control; cabinet work and loud-speakers, aerial wire, earth mats, &c., are also shown, and "Superial" flat copper strip, perforated to take 4 B.A. connections without solder; it can be turned and twisted easily with the fingers for wiring-up purposes.

Hart Accumulator Co., Ltd.

The company manufactures accumulators for all purposes, and its stand is one of the two largest devoted to batteries. A large variety of types is displayed, including several kinds suitable for radio reception work.

Whittingham, Smith & Co.

As their name implies, "Portadyne" radio receivers are portable sets enclosed in cabinets measuring 17 in. by 14½ in. by 8 in. deep, and provided with a carrying handle. Both four- and five-valve outfits are self-contained, including loud-speaker and batteries, but an external speaker may be "plugged in," which action disconnects the enclosed instrument.

Mr. Ernest Turner.

On this stand electrical measuring instruments for general use and wireless purposes are displayed; also a selection of condensers and coils, &c.

Universal Postal Frankers, Ltd.

Amongst this company's exhibits are electrically-driven postal franking machines containing three or six different denominations governed by one meter registering in the currency of the country.

I. Calvete, Ltd.

Besides electro-medical light-therapy apparatus and artificial sun-light lamps, electrical equipment for hairdressers is displayed on this stand, such as vibro-massage devices and hair-dryers and waving machines.

C. W. Dixey & Son.

Amongst the optical devices exhibited by this firm are various electrical aids for the deaf.

Technical Agencies Co.

This company is the agent for manufacturers of "Indurite" moulding powder and also moulded articles for the electrical and wireless trades.

Beetle Products Co., Ltd.

This company makes white moulding powders for electrical fittings, &c., and coloured powders for obtaining a translucent effect; also synthetic resins.

Birkbys, Ltd.

This company shows "Elo" synthetic resin moulded articles for the electrical and wireless trades in black, coloured and mottled colours; also moulding powders and varnish.

Scriptograph Co., Ltd.

The advertising devices shown consist of a lantern which projects moving pictures and script on to a ground-glass screen.

Radio Components.

In addition to the exhibitors of broadcast radio apparatus already mentioned, component parts and accessories are to be seen on the stands of Sidney S. Bird & Sons, Britains' Best Crystal, Ltd., Camden Engineering Co., Ltd., J.M.O., Ltd., Lissen, Ltd., Priory Loud Speaker Co., Ltd., Truphonic Wireless Co., Ltd., Western Laboratories, Ltd., M. & A. (Etherplus) Wolff, Edystone Radio Co., Ltd., and the Dubilier Condenser Co., Ltd.,

Manufacturers of cabinets for wireless receiving sets are represented by the Caxton Wood Turnery Co. and Universal Cabinets, Ltd.

Brilliant Sign Co. (1907), Ltd.

When referring to this company's display, we regret that the name "Internalite" day and night sign was applied to one of its exhibits, which, we are informed, is known as the interior lighting "Brilliant" sign.

Finally, mention must be made of the fact that, in addition to the usual postal and telegraph facilities and numerous public telephone call boxes, some three hundred special telephones have been installed on the stands of exhibitors in the section of the Fair housed at the White City.

Assisted Wiring Schemes.

The Fifth E.D.A. Conference.

THIS subject was again discussed at the E.D.A. Conference, held on February 18th, by Mr. W. F. T. Pinkney, of the Newcastle-upon-Tyne Electric Supply Co., Ltd. Mr. E. Slater (Editor of the *Electrical Times*) presided.

Mr. PINKNEY regarded assisted wiring as only a temporary measure, his view being that in the course of two or three years the necessity for it—at any rate for lighting—would cease to exist; the majority of houses would then be wired, and all new property was wired nowadays as a matter of course. He divided the methods of payment for assisted wiring into four categories, *viz.*, (*a*) short-term easy purchase of from one to two years; (*b*) medium-term easy purchase of from 2 to 7½ years (usually between 3 and 5 years); (*c*) long-term easy purchase from, say, 7½ to 10 years; and (*d*) simple hire. Generally speaking, the ordinary hire system, based upon a perpetual rental, would not become very popular with the public, nor would supply authorities be willing to offer terms which did not provide for redemption at the end of ten years or so. The companies with which he was associated had offered a system of short-term easy purchase over a period of one or two years, but it was not popular. The people who would agree to it as a rule were just as willing to purchase outright, and the system did not appeal to the tenant. The three to five years' scheme secured more business than the short term period, and, in his opinion, the 7½ to 10 year period was the best for lighting installations. The period was not so long that, with a reasonable standard of wiring, considerable cost was likely to be involved in maintenance, and the installation should still be in good condition when handed over to the consumer. Again, the tenant (as opposed to the property owner) did not consider it a great risk to make the relatively small rental payments required on a long-term easy purchase if he had to leave the premises after having paid his rental for a few years. The three main methods of payment for assisted wiring installations were: (1) the quarterly or monthly rental; (2) the prepayment meter system, with an increase in the price to cover rental; and (3) the additional price charged per kWh on quarterly or monthly accounts. He was in favour of charging rentals with the monthly or quarterly accounts, because it was the only system which did not affect the rate per kWh, and, therefore, was the only one which did not penalise liberal use. A large class of persons who were used to the slot meter system, still preferred that system. Until the problem of getting the consumer to take a supply other than through a prepayment meter had been solved, he did not see that full advantage could be obtained from assisted wiring schemes. To charge a monthly or quarterly rental for installations and to supply energy through a prepayment meter would mean doubling the cost of collection. Where it was possible to collect a weekly rental with the weekly house rent, as at West Hartlepool, this might solve the difficulty. No provision was necessary so far as lighting installations were concerned to cover the risk of disuse in the event of a change of occupancy and the new occupant refusing to rent the installation, because if a lighting installation were in a house it would be used. The danger did exist with heating or cooking circuits, however. In the case of the North-East Coast Companies the wiring was done by contractors, and so long as the contractors would work with the supply authority in a reasonable manner he saw no reason for setting up a wiring department. Only registered contractors were employed, and they had all agreed to schedule prices. For single installations these prices would not leave a large profit, but the method of canvassing enabled the companies to place orders for whole streets at a time, and a contractor able to carry out twenty or more installations could do so very economically. For a two-light installation the selling price to the consumer was £3 3s. 4d., the net price to the company £2 17s., and the monthly rental for 120 months, 1s. 3d. The prices increased progressively up to a 20-light installation, in which case the selling price to the consumer was £22 1s. 8d., the net price to the company £19 17s. 6d., and the monthly rental for 120 months, 5s. 6d. Plug points and two-way switching were installed as extras if desired. For installations of six lights or fewer the consumer had the option of paying 2d. per kWh extra on a prepayment meter. The company specified the class of material to be used, which was required to be of British manufacture. The great increase in the demand for accessories created by assisted wiring schemes, should result in lower prices, but there was a tendency towards increased prices. He hoped that the object of the Electrical Accessories Manufacturers' Association was not merely price maintenance. All supply authorities promoting assisted wiring schemes might get together and say what they required, what they considered to be a reasonable price, what a similar article could be bought for abroad, and that if they could buy at that price they could buy of British manufacture. In the case of assisted wiring schemes it was necessary to supply the first lamps; to omit to do so, particularly in the case of smaller consumers, meant that in order to cut down initial expenditure they would purchase one lamp only and carry it from room to room. There was also a tendency to use carbon lamps. With each monthly rental installation his company also included an electric iron free. That did not apply to prepayment installations. It was the practice of the company to maintain the installation (lamps excluded) for the first twelve months, but thereafter maintenance was undertaken by the consumer. It was necessary that application forms should be as simple as possible, in order that the consumer might understand them. For tenanted property a landlord's agreement was necessary. A standard figure of 30s. per service up to a certain length was charged for all services for small consumers, and this applied also to assisted wiring consumers, provision being made to cover this figure in the rentals. Particulars of service costs for underground services were given. The results obtained in 1926 were as follows:—

	Monthly.	Prepayment.	Total.
No. of applications received ...	3,021	9,064	12,085
No. of consumers connected ...	2,689	7,382	10,071
Net amounts paid to contractors	£25,052	£40,293	£65,345
Average net cost of installation...	£9 6 4	£5 9 2	£6 9 8 (average)
Annual revenue (energy only) ...	£11,500	£23,600	£35,100
Average No. of kWh used per annum	165	110*	
No. of electric irons supplied (10 months)	1,735	nil	

*Estimated.

In 1926 the actual consumption of prepayment consumers had fallen, due to the trade depression. In 1925 there were added 5,220 new consumers (apart from assisted wiring), and this could be taken as the normal rate of development. In 1926 there were added 16,472 new consumers, which included 10,071 assisted wiring consumers. The difference of 6,400 was nearly 25 per cent. above what was then the normal rate of development, so that the mere fact of offering hired wiring had secured many new consumers who had paid outright for their installations. The company was contemplating offering an assisted wiring scheme for cooking and heating circuits in residential property, and probably also water heating. Here there was risk of a hired circuit becoming disused before redemption if the period of hire were a long one. At the same time, the consumer would pay outright just as readily as he would pay rental over a very short period. The proposals provided for a five years' redemption period, and the intention was to require the consumer to guarantee to pay the rentals for three years. Heating circuits would be carried out by the contractors on a schedule, tentatively agreed upon, as follows:—

No. of radiator circuits up to 10 yds. run.	Contractors' price subject to 10% to company.	Monthly hire payments.
One	£2 12 6	1s. 0d.
Two	£5 0 0	1s. 10d.
Three	£7 2 6	2s. 8d.
Each additional circuit above three	£2 5 0	0s. 10d.
For lengths in excess of 10 yd. average run	1s. 7d. per yd.	1d. per 3 yd. or part thereof.

Cooker circuits would be run by the company's own men, because a cooker circuit could be carried out as a rule in half a day. The circuits would be surface jobs, in c.t.s. cable.

Discussion.

Opening the discussion, the Chairman gave particulars of an assisted wiring scheme in a town of 500,000 inhabitants in the United States, which he had received from Mr. A. Dow, of Detroit. There was vigorous competition by the gas company in the town. The metropolitan territory of the town had only 44,000 houses wired at the beginning of 1921, and in 1924 there were 110,000 residential consumers in that territory, as the result of the assisted wiring scheme. They were still adding at the rate of 1,500 monthly. In the period referred to, 66,000 homes were wired, and practically half the work was done by independent contractors, this representing three times the normal rate of increase of business before the campaign was started. It resulted in a total business amounting to well over £1,000,000 sterling. The

increased business of the central station had to be added to that. The scheme had prevented depression, which was imminent.

Mr. Edgar (South Shields) said that the prepayment meter was necessary in some cases. A considerable number of consumers were using irons, kettles, and other small apparatus on assisted wiring installations where prepayment meters were installed. The question of using larger apparatus, such as cookers, was a subject to be considered in relation to an alternative scheme to that of lighting. In no case at South Shields had there been the slightest difficulty with new tenants. In a number of cases the incoming occupier had paid the outstanding balance for the installation. At South Shields everything was supplied up to the lampholders. His experience showed that if schemes were carefully considered there was not the slightest doubt about their paying. The scheme in South Shields was commenced on May 12th, 1925. For the year ended March, 1925, there were connected to the supply mains a little over 4,000 domestic premises. At the end of June, 1925 (six weeks after the commencement of the scheme), there were an additional 750. At the end of December, 1925, there were 3,750 additional consumers; June, 1926, 8,902; December, 1926, 10,856. During 1926 the scheme was curtailed considerably owing to the indifferent coal obtainable, but the number of consumers actually connected under the scheme to date was 11,231. The average revenue per consumer was equal to 18.06 per cent. of the capital cost for mains and services, after deducting the extra charge of 2d. per kWh to cover the cost of installation and prepayment meter. Only a limited number had been connected for a full twelve months, and when the 11,231 consumers had been connected for twelve months the average revenue per consumer, as compared with the capital cost of mains and services, would probably reach a figure of 25 per cent. The capital cost of consumers' installations and meters from the inception of the scheme to date was £93,073, of which 6 per cent. had been recovered by the extra charge of 2d. per kWh, and the total revenue to date was £23,398.

Mr. C. H. Rayner (Manchester) said there had been some very satisfactory cases in Manchester recently in which landlords had wired a number of the houses they owned, in consideration of a small increase in the weekly rents.

Mr. A. C. Bostel (Hackney) said that in his district assisted wiring schemes were carried out under two systems, *i.e.*, extended payments for purchase, and free wiring. In such a district it was necessary to use prepayment meters to a large extent, and the charge for energy through those meters was 8d. per kWh, as compared with the ordinary flat rate of 5d. The lead-covered system of wiring was adopted, and the cost varied according to the number of lights. For a six-light installation the cost was sometimes as much as 27s. 6d. per point, which included switches, lampholders, ceiling roses, and lamps. If a cooker were installed, the supply authority provided it, carried out the wiring, and supplied through a separate prepayment meter calibrated at 1½d. per kWh: that was all the consumer paid.

Mr. F. H. Howell (Battersea) said that at Battersea there was a free-wiring system, which had been in operation for nearly two years, but there were not yet 1,000 consumers under that scheme. There was a standing charge per quarter of 16s. 3d. for six lights, plus 1d. per kWh for energy consumed. Very heavy lampholders were installed, so that consumers could use other apparatus. Irons were hired at 1s. per quarter, and kettles at from 1s. 6d. to 2s. (according to size), as well as cookers and fires. The scheme worked very well, and about 1,200 pieces of apparatus had been installed in 18 months.

Mr. F. W. Leevers, commenting on Mr. Pinkney's reference to price maintenance, said that the manufacturers to-day were very keenly alive to the necessity for the maintenance of quality. Cost of maintenance must be considered as well as first cost. "Electricity is cheap" was a "slogan" which should be constantly employed. He thought that electricity supply authorities might offer assisted wiring schemes to manufacturers to help them in the installation of the larger current-consuming apparatus.

Mr. H. W. Watts said that twelve months ago he had got a two-part prepayment meter into this country. They were used in thousands on the Continent, and the makers had a switch which would control the meter up to 20 A. The meters could be calibrated for any amount of shillings up to 15, and for any price per kWh. Such a meter was wanted badly for assisted wiring schemes, and he was sorry that no British manufacturers had placed one on the market.

Mr. S. B. Howard (Marylebone) said that in his area in the case of assisted wiring installations, the two contractors nearest to the premises to be wired were asked to tender, and the better was accepted. There were slot meters for any size of cooker. For one room they charged 6s. 6d. per quarter plus 1d. per kWh, and for two rooms, 7s. 6d. plus 1d. No charge was made for services.

Major Whittingham (managing director, Sussex Electricity Supply Co.) said his company had started an assisted wiring scheme, and provided lamps and shades. If they were not supplied, what assurance was there that the right type of globe and shade would be used? Should two-way switches be supplied as an extra, or omitted?

Mr. W. Ritchie (Hendon) stated that a weekly rental, ranging from 8d. for a four-point installation to 1s. 1d. for a nine-point house, plus the charge per kWh, was offered to his consumers, or alternatively, a supply through a slot meter, with an extra charge of 2½d. per kWh, and no fixed charge. He preferred the 1s. rather than the 1d. slot meter.

Mr. W. H. Edridge asked if assisted wiring schemes were wholly self-supporting?

Mr. Pinkney, replying to the discussion, said the selling prices of the installations provided by his company included lamps and shades. Two-way switching was supplied as an extra, if required. He could not see the advantage of the two-part prepayment meter. The collector had to take the ordinary money for energy from the meter, and it was just as easy to take the standing charges from the consumer as from another part of the meter. A disadvantage was that if a consumer had been away for a considerable time, he would have to put in a number of shillings to cover the standing charge for that period before he could get energy—and he did not like doing that, and the meter would have to be separately calibrated for every consumer. In reply to Mr. Leevers, he said his company would consider any industrial case that would show a commercial result. His scheme was self-supporting. The mains were not extended unless the company was satisfied that the business resulting would jutify it. Propaganda costs were included in the general costs of supply, but he could not say what percentage of the revenue had been charged to propaganda to obtain the new consumers connected under the assisted wiring scheme.

The Canadian Market.

General Prospects and Methods of Attack.

THE British exporter who wishes to extend his sales in the Canadian market has many problems to face. His chief difficulty is the presence just across the southern border of the Dominion of a formidable competitor who has penetrated the market in many directions and in many ways. The substantial financial interest of the United States in Canadian industries has led to the installation of a great deal of American machinery, the appointment of numerous American managers and foremen, and the fairly widespread adoption of American standards and methods. It is largely under these conditions that Canada has become as important industrially as agriculturally; consequently, keen competition has also to be faced from the factories of Ontario.

Another fact which is probably insufficiently recognised is that Canada is not one but several markets. There is Quebec, served by two great open ports in summer and by Halifax and St. John's in winter; in this province 80 per cent. of the population speak French. The sale of equipment and machinery must usually be effected by calling at works in various sections of the province. There is Ontario, with its active industrial cities of Toronto and Hamilton—the largest distribution centres of the province. The northern Ontario mining camps are large buyers of machinery, chiefly through Toronto and Montreal. Then there are the three Maritime Provinces containing, in Nova Scotia, the extensive works of the British Empire Steel Corporation. Turning west, the Prairie Provinces of Manitoba, Saskatchewan, and Alberta, have few factories, and at present mainly depend for their purchasing power on the success of agriculture, though mining and oil exploration are developing. This territory is being supplied to an increasing extent through Vancouver—an important change from the point of view of the British exporter, as will be seen later. Finally, there is British Columbia, formerly the most inaccessible province of the Dominion and now one of the most easily reached, owing to the opening of the Panama Canal and the establishment of direct services between British ports and Vancouver.

The many questions involved in catering to Canada's varied requirements are dealt with exhaustively in an admirable report by Mr. F. W. Field, H.M. Senior Trade Commissioner in

Canada, which has just been issued by the Department of Overseas Trade.

The value of the market, he points out, is materially increasing, and those firms who grow with the market will have substantial advantages. It is 3,729,665 square miles in extent, and over this large area is scattered a population of about 9,364,000.

Branch Works.

Mr. Field discusses in detail the several methods of representation which have been adopted by British firms with varying success. He gives first place to branch works, and on this subject his remarks will be of particular interest to the electrical manufacturer. Several British firms, he points out, have acquired an interest in Canadian manufacturing firms, but in these cases the British firms do not export to Canada.

One of the principal reasons for the substantial investment of the United States in branch factories is the desire to secure, as Canadian manufacturers, the benefits of British preferential tariffs. In the majority of cases it will probably be found that British manufacturers are able to export from their home works and do a profitable business in Canada. In certain industries, for various reasons, branch works of some sort may be necessary in order to transact a business of permanence and value. But many British firms might give careful consideration to the question of establishing a branch works in conjunction with an adequate selling organisation. If, after the most searching investigation, this course should be chosen, the firm may find it desirable to limit its initial operations to the assembling or manufacture locally of staples in everyday demand in the Dominion, utilising the distributing organisation of the local branch factory for the sale of the firm's more specialised finished products, which can be imported from the home factory, along with such semi-finished products or parts as are necessary.

In deciding to establish branch works, one of the first questions demanding consideration is whether it is more satisfactory to start an entirely new organisation or to proceed by associating British capital and experience with those of an existing Canadian organisation. Mr. Field says that a definite recommendation cannot be made in regard to a matter of this kind, but that there are many advantages in adopting the latter course.

A policy which has been followed by makers of machine tools, electric motors, and other machinery and equipment, is to establish their own branches in the Dominion, with repair shops. They must be careful to maintain stocks at important points adequate to, but not in excess of, actual requirements.

On the subject of agents on commission, Mr. Field considers it desirable, in view of the losses which some British firms have sustained in recent years through the appointment of unsuitable agents, or because suitable agents have not received the proper support, to repeat certain cautionary remarks which he has made in previous reports.

Hope for Trade Expansion.

For engineering firms a method of representation which has proved successful in more than one market is that of a joint arrangement among non-competitive concerns. Mr. Field's belief is that in this method, properly operated, lies considerable hope for the expansion of British trade. He supports his opinion by pointing out that three of the factors which have operated in the past against greater business in machinery and engineering supplies are the lack of sufficient local representation and active salesmanship, the failure of British manufacturers to keep in constant touch with those who have purchased their machines, and the inability to effect repairs and supply spare parts at short notice.

While the business in any one line may not be large enough to justify the establishment of a proper local organisation, which should remove the difficulties noted, it might prove feasible for several manufacturers of non-competitive machinery to have joint representation here, with a technical man to look after repairs, a good sales organisation which would adopt the American "follow-up" system, as it is termed, and a stock of the spare parts which are most likely to be needed.

Mr. Field adds:—"Several British firms who have either Canadian branch factories or offices are in a position to represent other British firms. By undertaking the representation of other British firms in somewhat similar lines the overhead expenses of the firm already established here are reduced and a good selling organisation is provided for other British firms at comparatively low cost."

The Personal Touch.

The Trade Commissioner emphasises the desirability of a personal investigation of the market in order to ascertain its possibilities and decide upon a course of action. In this connection he makes some useful suggestions regarding a suitable itinerary and also gives details of the time and expense involved. The best procedure to follow in respect of samples is also described. Attention is drawn to the facilities for storage and distribution which have been established by several reliable firms in most of the important cities of Canada.

Mr. Field finds it necessary to draw particular attention to the fact that Canadian buyers attach much importance to deliveries, not only for the usual commercial reasons, but often on account of special considerations. The construction season in certain parts of Western Canada is of short duration. Contractors time their operations to a day, and are often under heavy penalties if their work is not then concluded. Sometimes delivery is required at a particular time because navigation to a certain port closes for the winter, or because machinery can be taken into a lumber, mining, or construction camp only on sleighs over the snow. Thus there are many good reasons why Canadian buyers must often insist on delivery by a certain date.

Publicity.

An interesting section of the report is devoted to publicity, embracing such varying media as kinema films, press advertising, attendance at conventions, exhibitions, and wireless programmes. In introducing the subject, Mr. Field makes the rather startling pronouncement that the cause of British trade has undoubtedly suffered from despatches which have appeared in sections of the Canadian Press. It appears that doleful and even harmful news concerning economic conditions at home finds its way through the foreign agencies.

Mr. Field observes that anything further which can be done by British manufacturers collectively and by the United Kingdom and Canadian Press and Press agencies in this direction, will be of immense value in helping to create a better selling atmosphere for British goods. He adds that the kinema film has also operated against British trade. The production, distribution, and exhibition of films in Canada is almost entirely controlled by foreign interests.

After referring to the necessity for keeping in personal touch with consumers, the report discusses the question of advertising generally. He says that while British firms, as a group, have increased their advertising in the Canadian market in recent years, firms of United States origin are still among the largest patrons of advertising space in Canada. Good results have accrued from advertising in Canada which has been properly planned and directed. There are so many factors peculiar to the Canadian market to be considered in an advertising campaign that he suggests expert knowledge of the Canadian market should be secured, say, by the combined assistance of United Kingdom and Canadian advertising agencies.

The manufacturers of the North American continent look upon advertising in the daily, weekly, monthly, trade and technical Press as an excellent investment. While this may be the same in the United Kingdom the policy of the United Kingdom firms, as far as advertising and publicity in the Canadian market is concerned, is, generally speaking, weak. Yet, with the keen competition to be met in all lines and in a market which buys largely the goods for which publicity has helped to create a demand, it is necessary to have a continually favourable atmosphere to assist a salesman. Spasmodic advertising is of little value. A well prepared and properly conducted campaign, over long and repeated periods, gives the greatest service. This market lacks the favourable publicity atmosphere which our competitors have there, and a change in this condition is a matter of great importance.

Mr. Field makes some observations regarding the Chicago Underwriters' Laboratory and the effect of its rulings on the sale of British electrical appliances in Canada. He refers in his report to the provision in the Dominion tariff for assisting the development of industries in Canada by exemptions from, or reduced rates of, duty on certain articles utilised in such industries. It is to be feared, however, that this concession is not likely to be of much service to the British electrical manufacturer.

Switchgear in the United States.

Writing to the *Electrical World*, Mr. M. M. Samuels, of the J. G. White Engineering Corporation, says: "Rupturing capacity guarantees were always a joke. No manufacturer was ever ready to submit the figures upon which his breaker rating was based. When a transformer or a motor or a turbine is purchased, there is no mystery about the guarantees; the constants and calculations upon which they are based are available. Not so in the field of breakers. . . . Large public utilities did make a great many tests recently at their own expense—the only tests of any value so far. But why did these public utilities undertake these tests? Why did they select breakers instead of any of the other thousands of articles which they are regularly purchasing? They found that they were spending millions on switches about which they could get very little information, and after spending all these millions they found themselves losing fortunes through service interruptions without any possibility of ever collecting anything from the manufacturer on a rupturing-capacity guarantee. Therefore they made up their minds that they were going to find out for themselves. All credit to them. If they keep up the good work, they will find out a great deal. They have already found enough to make the manufacturers refuse to give any guarantee on rupturing capacity. Who ever paid money for a piece of property because the man who sold it 'believed' that he had a deed? What is needed in the switching game is not merely bigger tanks, more oil, heavier contacts, &c., but new ideas, radically new ideas. Not development, but invention. What is the matter with the American inventive genius?"

Electrical Wholesalers Federation.

Annual Dinner.

THE annual dinner of the Electrical Wholesalers Federation was held at the Savoy Hotel, London, on February 24th, when some 230 members and guests were present, and Mr. G. P. Dennis, president, took the chair.

The Rt. Hon. Viscount Peel, P.C., proposed "The Reorganisation of the Electrical Industry." He said that in the Electricity (Supply) Act, 1926, the Government had taken full advantage of the knowledge of the State. The connection between the Government and science was growing closer each day. He thought that perhaps it was unfortunate that in this country we were the pioneers of the electrical industry, which had had to adapt itself to old houses. He agreed that there had been some State interference in the industry; but the Government was trying to harmonise those imperfections which the lack of co-operation between politicians and science had brought about. What was wanted was the minimum of State interference compatible with the production of electricity on the maximum scale. He did not think that any measure had been submitted to such thorough investigation as the Act had. As a result of the Act there must be a vast increase in the use of electricity, and if it did not also result in a large reduction in the price of electricity then the Board and the Commissioners should be scrapped. He congratulated the societies who had brought about the concordant clause in the Act. He believed that the country would return to those simple virtues which had made us great. In the chairman of the Board they had a man with all the qualities essential for the control of a great business.

Lt.-Col. J. T. C. Moore-Brabazon, M.P., seconded the toast. He said that he had been associated with the electrical industry for two years in trying to build up a measure of reorganisation, and he had no lack of confidence in the Act. He felt that it would result in progressively greater benefit as the years passed. In referring to his new enterprise in the treatment of coal, he said that they must face the cardinal fact that coal was the basis of industry in this country. It was necessary for all parties to put in the whole of their weight; he did not think that the railways were doing this. Was it right that on the north-east side of London there were no plans for suburban electrification? The railways had recently taken £6,000,000 out of reserve, but there was not a word of electrification. He had recently seen the domestic power curve of an important American company, which showed its maximum load in the summer, due to the refrigerating plant installed; that showed what could be done.

In reply, Mr. R. W. L. Phillips, president, I.M.E.A., heartily congratulated all those who had been elected on the Board. His Association was looking forward with the utmost confidence to the result of their deliberations. Most supply engineers would soon cease to be manufacturers and become distributing factors. But the electrical engineer had always been used to reorganising, and had worked along the lines of the Royal slogan, "Adopt, adapt and improve."

"The Electrical Wholesalers Federation" was proposed by Mr. D. N. Dunlop, director, B.E.A.M.A., who reminded the company that at the last dinner it was suggested that his Association did not do all that it might for the contractor, and that the conference which was arranged for the next morning had resulted in Clause 48 in the Act, which gave the contractors a status. Success was impossible without the hearty co-operation of all the representative bodies. He suggested that Sir Andrew Duncan and his colleagues, without waiting for the "grid," might bring pressure to bear upon those undertakings where the charges were high. He thought the people of the country were sufficiently well educated electrically to adopt electricity if it were obtainable at a reasonable price. Cheap electricity in this country was only possible with cheap coal; he was pleased that there was to be a fuel congress in 1928. The wholesalers excelled in salesmanship—not to the public, but to experts. If Clause 48 overcame the tendency to buy off the foreigner, it would bring about a reduction in unemployment. He suggested a further conference of all the associations to evolve a scheme which would be to the benefit of all interested.

In reply, the President said that all were greatly impressed by the responsibilities that had to be taken, not only by the Government and the Electricity Commissioners, but by the whole of the electrical industry, in order that there should be a co-ordinated system of all concerned. The underlying principle governing the organisation of the industry was to do the best for Britain. The greatest good could only come to the nation when all its members put into the industries the maximum amount of energy, time and thought of which they were capable. The electrical industry was, next to coal, the key industry of the country; it was safe to prophesy that electricity would be available in every household throughout the country. The problem of electrical service was not only to generate cheaply, but to endeavour to supply the complete installation, at the least possible cost. One of the chief aims of the Federation in supporting and sustaining the manufacturers was to guard and protect them against the financial bad patches that existed in Great Britain. They required in British-industry leadership three essential qualifications, vision, vigour, and insistence. All must work to the same end, stimulated by a common purpose to place Great Britain pre-eminent in the manufacturing world. The labours of the trade combines in the country had not produced the results hoped for, because they had been individualistic. They had recently had a glaring example of the effect on British industry of sectional working. A number of battery manufacturers formed a ring, the object being to sell to the user only. The wholesaler and contractor naturally looked about for fresh supplies. His Association endeavoured to get in touch with the ring to see if a working arrangement could not be made, but could not even get a reply to the letters sent. The result was that there was an enormous increase of imports, and the manufacturers themselves lost thousands of pounds of orders.

In proposing "The Guests," Mr. A. G. Beaver said the Federation was particularly honoured by the presence of Sir Andrew Duncan; it was the first electrical function that Sir Andrew had attended. The chairman of the Board could see the harmony which existed between the representative bodies in the industry, all of which would give him every assistance.

Sir Andrew Duncan, in reply, said he was glad to have accepted a position of service in an industry which would play such an important part in the future progress of the country. He felt that it would be wise to approach his new sphere with caution and not disclose too much too early. He thought that if the new child, the Electricity Act, was not nursed into healthy manhood, then the blame should rest with Col. Moore-Brabazon.

Mr. H. J. Miles, president, N.E.C.T.A., also replied, as did Mr. P. J. Brewer, chairman, E.L.M.A.; the former said that the bringing together of all sections of the industry, due to the efforts of Mr. Dunlop, had made the position satisfactory. Mr. Brewer stressed the point that the machine of co-operation was not yet ideal. Whatever happened, the fullest co-operation possible was wanted between the various associations.

The proceedings concluded with the toast, "Our Chairman," proposed by Mr. George Donovan. During the evening musical items were rendered by Mr. Topliss Green and Miss Ethel Sanders.

Correspondence.

***Correspondents should forward their communications* as early as possible.** *No letter can be published unless we have the writer's name and address in our possession.*

Electric Power on the Farm.

As a result of my article on "Rural Electrification and Agriculture," published in your issue of February 11th, I have had many letters from technical experts questioning the advantages of direct haulage of ploughs, &c., over the old wire-winding system.

Let us look broadly at this question and take East Lothian, where the standard of cultivation is second to none, as an example.

Some years ago there were many steam ploughing sets at work here—to-day I do not know of a single set, the wire winders are extinct. On the other hand, practically every farmer has a tractor, and a good proportion have two; in other words, direct haulage is universal.

Another example: Edinburgh 20 years ago equipped herself with a well-laid-out system of steam-driven cable cars, wire-hauled. They were scrapped last year and the direct haulage electric trolley has turned what was a failure into a conspicuous success.

I don't know of a single surviving example of wire-hauled cars; are they, too, extinct? In other words, practice has proved that it is more efficient to transmit power electrically than through a wire-haulage system.

Again, let us look at the problem from the farmer's economic standpoint.

Let us suppose the big wire-winders are the only practical machines; the farmer hires a set, gets his ploughing done, and the wire tackle moves on. The farmer is left in the spring time (when his peak load occurs) without any power-driven implement on his farm, and presumably with fewer horses than he normally would keep. How is he to carry on? He is in a similar position to that which he occupied with the old steam winders which he has ceased to employ.

No, Sirs, what the average farmer with 250 to 500 acres requires is a light tractor—reliable, cheap, and long lived; he must have it all the time, and his power unit should be so designed that normally the ploughing of the farm should be a one-man job. With cheap power this will lead to an increase in arable and a reduction in grass land, for the farmer will strive to keep an economic machine at work, and the horses, which will be considerably reduced in number, will mainly be used for the farm transport work except in the spring, when they will follow the power-driven cultivator and grubber and generally do what we may call the "gentleman's jobs." Then, again, when the crops are sown and the increased acreage of arable has led to an increased green crop of turnips, potatoes, and sugar-beet, the decreased horse staff

will be unable to undertake the drill-grubbing and cultivation which is essential to the success of these crops.

The tractor must again come to the rescue, and I may say that in designing my tractor this drill work was specially kept in mind; the flank wheel forming the third point of support is mounted on a slotted shaft, so that the breadth of track may be altered to suit any width of drill.

When the foliage closes the drills, hay and grain harvests are waiting, and again, if required, the light tractor can do the reaping; and when the stubbles are cleared the tractorman hitches on his plough and starts his cycle afresh. How can the wire winder, which is useless among crops, hope to compete with the above?

It will require a bellyful of power for a short period and a power line designed and built to supply that power (which will be idle 70 per cent. of its time).

As a farmer I don't like the idea, and I think I can guess the feelings of the power engineer.

Andrew McDowall.

Mungoswells, *February 22nd*, 1927.

Power Supply for Wireless Sets.

I trust you will allow me a final letter in reply to that of Mr. Turner in your issue of February 18th, after which I will not trouble you further.

Briefly, the receivers I had in mind are manufactured by Standard Telephones & Cables, Ltd., although they are not marketed under that name, and as apparently Mr. Turner has acquaintances connected with that company, it should not be very difficult for him to obtain the apparatus for test. He admits he has not tested it, but allows that Standard Telephones *should* be able to make a good receiver, which is not surprising in view of the fact that this company was responsible for most of the apparatus in connection with the recently inaugurated transatlantic telephone service.

Should Mr. Turner be able to obtain facilities for a test of this 4-valve receiver, he will be able to find out for himself whether my contention is self-evidently absurd or not. My tests give me the following figures: 2-valve tuner, 3 mA at 12 volts, 2-valve amplifier, first valve 2 mA at 60 volts, last valve 4 mA at 120 volts. I am quite willing to leave the quality of reproduction also to any of Mr. Turner's tests.

If after test Mr. Turner still will not agree that distortionless reproduction can be achieved with this low wattage, I should be very interested to know on what tests he bases his contention. If it is possible later to arrange a test, it seems to me that it should take place in my district, a difficult spot on the South Coast, and not in London, in order to obtain a comparison under not too easy conditions. I should prefer, however, that Mr. Turner tests the apparatus for himself.

It will be obvious that before I can consent to any independent test I must obtain, if not the co-operation at least the consent, of the manufacturers.

February 19th, 1927. **Interested.**

Electricity Supply Tariffs.

I have been very interested, on my return from South Africa, in seeing the article by Prof. Cramp on "Electricity Supply Tariffs," as it confirms my article, "The Revival of an Old Tariff," in your issue of July 2nd, 1926.

My firm's order book shows an increase in the use of the two-rate system of charging all over the world, and it seems to me that this system will be an absolute necessity if the valley which most stations show in their load curves during the night hours is to be filled up with water heating, as I firmly believe it will be.

Prof. Cramp gives a testimonial to the ingenuity of Swiss inventors in having produced "a wonderful series of automatic time switches." I should like to show him that England is in no sense backward in this direction, having a world-wide reputation second to none for this class of apparatus.

I hope that when he is next in town he can spare time to give me a call, when I shall be very happy to show him a few of our "marvels."

Ernest E. Sharp,
Director, VENNER TIME SWITCHES, LTD.

London, *February 14th*, 1927.

Kiosk-type Sub-stations.

I am fully aware of the principal reasons for substituting the above type of sub-station for the brick-built type of e.h.p. systems, but why lower the standard of safety as embodied in the design of most of the modern sub-station switchgear?

It is no use blaming the manufacturers for introducing cheap switchgear into the design of these kiosks; rather should this rest on the users who encourage them to supply it, for after all they are the persons who have to handle it in service and who should know what constitutes a safe and sound engineering job.

In power stations of to-day, and under much more ideal conditions, the design of e.h.p. switchgear is such as to reduce to a minimum the possibility of accidental contact with live metal, and I consider that those whose duty it is to install and operate e.h.p. switchgear in outdoor kiosks should see to it that the operator is amply protected.

I have recently had occasion to draw up a specification for the interior requirements of a 6,600-volt kiosk, and knowing the possible conditions under which a person may have to operate the switchgear, I could only come to one conclusion, namely, that of specifying totally enclosed, metal-clad, drop-down type units.

This type of switchgear costs a little more, but has many advantages for this class of sub-station over an ordinary oil switch and bare isolating links, and is well worth the extra cost involved—if only from the point of view of safety.

The primary object of introducing kiosk sub-stations was to economise on land and buildings, both as regards the cost and obtaining of suitable sites, and not to expose persons to danger by cheap arrangements of switchgear.

Why not start and cut down the expense of the transformer?

I will go one further than "P.M.W.," and instead of suggesting additions to the open-type switchgear, I would suggest to the manufacturers that they scrap the present design of the e.h.p. chamber and substitute gear of the totally enclosed type, which can be made very compact and safe, and at least offers an equivalent protection to that obtaining in well-designed sub-stations or power stations.

The remedy is in the hands of the users, and any economy they wish to make in respect of the cost of sub-station equipment should be consistent with safety and efficiency, particularly with regard to e.h.p. switchgear.

P. Wardle.

Walsall, *February 26th*, 1927.

With reference to the letter by "P.M.W." on the above subject, which appeared in your issue of February 25th, 1927, I should like to express my full agreement with his general conclusions.

At the same time, I feel that it is necessary to draw your attention to the fact that one manufacturer of kiosk sub-stations—*viz.*, The General Electric Co., Ltd.—has been quoting for and supplying kiosks for several years, which do embody every essential precaution to adequately protect a visiting attendant from the danger of accidental contact with e.h.p. live metal.

It is essential in kiosk design to construct the switchgear in a manner which fully complies with H.O. regulations, and in order to do this, proper attention to the enclosure of the h.p. isolators is perhaps the most important point.

In the General Electric Co.'s standard design, whether for single incoming-feeder equipments, ring-main, or other feeder requirements, the isolating links are enclosed in independent cells or cubicles for each individual feeder or transformer circuit. These cells have separate lock-up doors inside the main doors of the kiosks.

After opening the isolator links, their covering doors can be closed and locked, so that the attendant can clean or inspect the oil switch and transformer in perfect security without any risk of slipping, or of being blown by high winds, into accidental contact with live metal.

Alternatively, completely enclosed "armourclad" draw-out h.p. switchgear may be sometimes employed, this being housed inside the kiosk. The leaflet enclosed herewith gives a reproduction of the illustration of a G.E.C. kiosk which was printed on page 1009 of your issue of December 17th, 1926, and which clearly shows the inner door construction.

Herbert J. Coates.

Birmingham, *February 26th*, 1927.

The Earthing of Portable Domestic Appliances.

In the ELECTRICAL REVIEW for February 25th, I read with interest the letter written by "A.M.I.E.E." regarding the earthing of all electrical appliances, which I think is a necessity; but as there is no law compelling contractors to take the steps required for safety, they are bound by the low prices they have to quote (to stand any chance whatever) to put in only what they are compelled to provide. I have the greatest admiration for the Institution of Electrical Engineers, and I think if that body laid this matter before the Home Office it would receive all-round satisfaction, because every contractor would be compelled to see that all appliances were earthed, and all corporations would be compelled to examine that earth and see that it was satisfactory; further, it would tend to help contractors to give estimates with the satisfaction of knowing that all other contractors were compelled to do the same. It is a matter that needs fostering for the consumers' safety, and while the majority of consumers are ignorant of its importance, the majority of contractors are neglectful.

Joshua Rose.

Bacup, *February 25th*, 1927.

The Salaries of Engineers.

Surely your correspondent, "Another Poor Blighter," is aware that the question of engineers' salaries will never ruffle the placid minds of the Council of the I.E.E. Obviously these gentlemen are quite satisfied with their salaries, and consider it somewhat vulgar for the lesser fry to mention such a sordid subject.

All other bodies which profess to look after the interests of engineers seem to be very keen on improving their social status without thinking of the possibility of obtaining increased salaries to keep up such social status as they already have.

I quite agree with your correspondent's remarks in connection with the post mentioned, but this is by no means an isolated instance. One has only to scan the "Situations Vacant" columns in the electrical Press to gain ample proof of this.

It is high time that the I.E.E. Council should bestir itself and take up the question of fixing minimum salaries for electrical engineers. If this august body *will not* move in the matter, anybody who will seriously take up this question of salaries, neglecting social status, will, I am sure, receive ample support from the rank and file.

Yet Another Poor Blighter.

February 25th, 1927.

River Water—or Cooling Towers?

Owing to illness I have only just seen Mr. Waite's most interesting article and the ensuing correspondence, or I should certainly have had something to say on the matter at an earlier date.

I quite agree with his general argument and with his contention that, things being as they are, reliable test results are the only criterion to go by. Also I have every reason to have absolute faith in the accuracy of his test figures. But it is easy to recognise what machines have formed the basis of his argument, and I do not think it is right to employ test results on medium-powered turbines more than 10 years old to settle a 1927 problem. From actual test results on two types of machines of larger output, recently set to work, I think that he has very considerably overestimated the defect from the theoretical in the really modern machine. The gain in steam consumption on different types of large modern turbines at 0.9-in. Hg, compared with 1.8-in. Hg, we find to be 6.0 per cent. as an average figure at full load compared with Mr. Waite's 4.0 per cent., an improvement of .50 per cent., which may conceivably influence the argument.

E. Fawssett.

Riding Mill, Northumberland,
February 23rd, 1927.

Extra-High-Pressure Cable Discharges.

I was recently informed of two instances of a curious phenomenon connected with super-pressure cables. It would appear that the cable in question had been tested with high-voltage direct current, and after the test this cable was discharged and all three cores were then permanently connected to earth at one end of the line only. Some hours afterwards a potential had apparently built up on the cores at the other end of the line, and a man proceeding to work on the cable received a severe shock.

The case of a cable building up in potential after a temporary discharge is, of course, well known. The theory of dielectric absorption and resistance which accounts for this does not, however, offer any satisfactory explanation when one end of the cable remains connected to earth.

I find it difficult to accept my information, and I should like to know if any of your readers can recall similar occurrences and can put forward any theory to account for same.

D. P. Sayers.

Blackburn, *February 23rd*, 1927.

A Handicap to Electrical Progress.

Mr. Ivan Fawcett in his letter to you of February 11th registers amusement, and, to do him justice, does it very well, but it shall be said of him, as of someone else whose name escapes me, "nihil tetigit."

I live in Rome and reside in the suburb of Cloaca Maxima. The electricity supply authorities in that particular neighbourhood have had £3 of my money for the last 14 years. They had it from me at a time why my credit was good, and for reasons best known to themselves. You see, they are not commercial. They have done nothing to my meter for 14 years except read it. I pay very little for what power I use, and don't worry, as I know that they are not business people in the ordinary intention of the term.

I think it would be a great mistake to complain.

F. Curius Dentatus.

February 21st, 1927.

A Metering Problem.

At a certain factory taking a supply at 415 V, 3-phase, 50 cycles, the energy was measured by an "Aron" 3-phase meter, in conjunction with a "Reason" mercury max-demand indicator, this combination working from the usual current and potential transformers. The supply company recently removed the transformers, and installed a "Sangamo" 3-phase meter, with its own transformers, but connected the "Aron" meter in with it; with the result that neither meter reads an amount anywhere near the previous reading (when the "Aron" meter was running off its own transformers), and there was also a difference between the "Sangamo" and "Aron" of approximately 4,000 kWh in a little over a week. Thereupon the company installed a portable meter (also *on the same transformers*), to check (?) the other two. No two of the three meters read alike. The company now claims that the "Aron" meter has *never* read correctly, and proposes "averaging" its presumed loss (I do not know how), on the "Sangamo" meter's reading, which is considerably higher than the "Aron" meter has ever been.

In my opinion, it is utterly impossible to connect three totally different meters to a set of current and potential transformers which have been designed to operate one particular meter. The load is a 250-kW motor-convertor (Peebles), and about 32-kVA of induction motors and a heater. There are no unbalanced conditions.

E. H. K. P.

February 20th, 1927.

"Do It With Electricity."

In view of the ever-increasing activities of the E.D.A., and kindred organisations, to further the sale and use of things electrical, a little commentary based on the observations of a "looker-on" who sees *much*, if not *most*, of the game, may be helpful, if not pleasant, reading.

In a nutshell a very large volume of valuable electrical business is passing out of the hands of the electrical trade, whilst their various associations of contractors, wholesalers, and manufacturers sit wasting time round their conference tables in solemn conclave denouncing their satellite associations for *doing*, or *not* doing, "this, that or the other"; instead of sitting up and taking notice of what is actually going on under their very noses.

In the first place, I notice that contractors, wholesalers, power undertakings, and even manufacturers, absolutely neglect the biggest potential field to which they should address their activities, *viz.*, the *industrial* field, which is over-ripe for *more* and *more* electrical labour-saving tools and appliances.

Take a glance at the window displays of the average electrical contractor, wholesaler, and supply authority. You observe there all sorts of frills and fancies; expensive fittings and gadgets, to tempt the money from the already strained pockets of the more affluent householder; but there is utter absence of any of the ever-growing array of labour-saving tools, &c., that are the potential life-blood of industry, whether it be the individual artisan or the larger works and contracting organisations.

Let us take a few examples:—

(1) *The Portable Electric Drill.*—This tool in various forms, and sizes, has entered into the daily life of practically every branch of industry; the demand is daily increasing, and thousands are being supplied weekly, yet what do we find? Scarcely *one per cent.* of the electrical drills sold are handled by electrical contractors or wholesalers; but they have made a nice steady and profitable turnover for others who have seen the market and have created, stimulated, and met the demand! Even the motor accessory wholesale houses are selling literally thousands of electric drills (apart from other electrical gear) which would never have been allowed to get into their hands if the electrical trade had kept in advance of electrical progress and had cultivated the markets that should be theirs, by heritage, if not by right.

There is scarcely a laborious manual operation for which an appropriate time-saving electrical equivalent is not available. The writer is associated with an enterprising young firm that scours the world's markets for electric labour-saving tools and appliances and puts the cream before the potential users.

(2) "*Electric Hammers*" that can cut through brick and concrete at the rate of an inch a minute, *30 times as fast as hand drilling*, and can be operated from an ordinary lighting point. Now this is an ideal electrical contractor's tool, and is in use by a number of wide-awake contractors; but the average contractor thinks £40 or £50 a big outlay. So is the too-heavy wages-bill for the more laborious method.

(3) Electric hand-saws for ripping or cross-cutting timber up to 3¾ in. thick.

(4) An electric hand-planer does away with jack planing, &c.

(5) An electric portable sanding machine for smoothing-off wood work.

(6) A portable electric mortising machine.

(7) Portable electric cloth-cutting machines for cutting out thick layers of various fabrics.

(8) An electro-hydraulic car-washing plant which reduces washing costs by two-thirds.

(9) Portable and universal electric grinders.

(10) Universal electric sawing, sanding, and grinding machines.

(11) Portable electric screwdrivers and nut-setters.

(12) Portable electric valve grinders, and so on. . . .

These are but a few of the electrical industrial appliances that we are handling every day and in increasing volume. They are not "novelties," but "necessities" to the many thousands of firms and persons who are using them on their daily production.

The economic conditions arising out of bloody and bloodless warfare have made these things essential to cope with competition. As wages increase, so must the "man-hours" per job be decreased to make the job pay. The domestic load is, we know, a most important factor in the power station,

but it is the industrial load which makes for the prosperity of the nation.

The biggest culprits in ignoring the vast possibilities of portable electrical industrial tools and appliances are the electricity supply authorities. Let us consider, for a moment, the wasted opportunities of housing schemes.

If the supply authorities made a point of running in their mains to the housing scheme sites *before* the foundations were got out, I believe that the labour costs of erection could be reduced by 50 or 60 per cent., by utilising electricity to speed up work that is at present done by hand. This would affect such operations as excavating; loading and unloading materials; concrete and mortar mixing; elevating materials to upper storeys; sawing, planing and sandpapering; cutting away walls, &c.; electrically melting plumbers' metal; soldering; screwing up woodwork; giving artificial light morning and night in winter time, to permit full working time or overtime; spray painting to supersede the old-fashioned brush methods; boring and drilling, and so on.

Electricity is used on building operations all over the States and Canada and many other of our go-ahead Colonies. It is also widely employed in London and various other cities. The supply *has* to be fed into the houses in any case, and it seems a great pity, therefore, that the supply authorities should miss such an opportunity to derive some revenue from their mains *before* the limited and less profitable domestic load is imposed.

We talked things over the other day with one of our leading building contractors who had displayed interest in our portable electric tools. He said that, as things were, these useful appliances could not be used *on the job*, as current was never available until the buildings were ready for occupation; so his employment of these tools was restricted to his workshop. When we suggested that he could overcome the lack of vision and enterprise of the supply authority by having portable generating plant, he at once gave us *carte blanche* to supply a generating set, on wheels, that he could ship from job to job on a lorry.

The moral is that this builder was so impressed with the value of portable electric tools from his limited experience in his workshop, that he was prepared to spend some hundreds of pounds to enable him to extend their use to the *job*.

The power undertakings, the wholesalers, and electrical contractors (especially the latter) must wake up to the possibilities of lightening labour, they must use their knowledge and endeavours to educate the tradesman to the use of portable electric tools, and not be content to sit behind their counter and wait for inquiries. They must *go out* and *make* the inquiries and *place the goods*.

The writer's experience is, that the average "man in the street" to-day (even the schoolboy) has a sounder technical knowledge than many of the self-styled electrical contractors, &c.

My parting advice to the electrical industry, as a whole, is: "Look to your laurels," and do not consider it beneath your dignity to read, mark and *learn* everything that you can possibly absorb on matters electrical, especially in relation to all things appertaining to *production*.

Therein lies one certain road to a healthier tone of the "profit and loss" account.

I shall only be too pleased to help all or any who are interested in the vital problem of applying electricity to profit in the workshop or on the job.

A. E. Long

(*General Sales Manager*, B.E.N. PATENTS, LTD.)

London, *February* **21st, 1927.**

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1925.

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24,736. "Electric fuses." R. H. D. Barklie. October 5th, 1925. (265,263.)

26,263. "Electrical jack and plug connectors, particularly for use in telephone systems." Automatic Telephone Manufacturing Co., Ltd., and C. R. Woodland. October 20th, 1925. (265,269.)

27,525. "Electric heaters." O. L. Peard and A. F. Harrison. November 2nd, 1925. (265,279.)

27,593. "Electric switches." F. McElroy. November 3rd, 1925. (Cognate application 12,532/26.) (265,284.)

27,656. "X-ray tubes and the like." C. L. Long, V. E. Pullin, and C. Croxson. November 3rd, 1925. (265,288.)

27,739. "Gaseous conduction electric lamps." British Thomson-Houston Co., Ltd. November 7th, 1924. (242,647.)

27,765. "Electrolytic deposition of cadmium." E. C. R. Marks (Grasselli Chemical Co.). November 4th, 1925. (265,292.)

27,952. "Adjusting devices for radio tuning apparatus." A. H. Curtis, B. Jones, and Igranic Electric Co., Ltd. November 6th, 1925. (265,300.)

27,954. "Inductance coils, transformers, and the like." G. W. Melland. November 6th, 1925. (265,301.)

27,985. "Electric synchronising systems." British Thomson-Houston Co., Ltd. (General Electric Co.). November 6th, 1925. (265,302.)

28,443. "Protective devices for electrical apparatus." Siemens Bros. Co., Ltd., E. A. Petithory, and E. R. Garrod. November 11th, 1925. (265,310.)

28,544. "Device for eliminating natural oscillations arising in electric circuits, chiefly for eliminating the effect of strays in wireless apparatus." L. Levy. November 15th, 1924. (243,003.)

28,616. "High-ratio reduction gear for application to the tuning controls of wireless telegraphic apparatus and the like." G. W. Parr. November 13th, 1925. (265,312.)

28,978. "Ignition apparatus for internal-combustion engines." S. Woodhead. November 17th, 1925. (265,316.)

30,487. "Generator charging systems for electric batteries, particularly for use with radio apparatus." Igranic Electric Co., Ltd., and S. R. Wright. December 2nd, 1925. (265,328.)

30,704. "Controllers for electric motors." Igranic Electric Co., Ltd. (Cutler-Hammer Manufacturing Co.). December 4th, 1925. (265,330.)

31,244. "Police signalling systems." G. Longfield-Beasley. December 10th, 1925. (265,338.)

31,251. "Telephone receivers." C. W. Mills. December 10th, 1925. (265,339.)

31,582. "Indicator for use with internal-combustion engines to test the sparking plugs." H. W. Smith. December 15th, 1925. (265,345.)

1926.

594. "Variable electrical resistances." F. L. Cheers. January 8th, 1926. (265,356.)

1,202. "Electric switchgear." British Thomson-Houston Co., Ltd., and H. Trencham. January 15th, 1926. (265,360.)

2,320. "Carrier for supporting an accumulator, battery, or like device on a motor-cycle or the like." N. J. Patchett and R. A. Stone. January 27th, 1926. (265,366.)

2,798. "Electric liquid-containing radiators." G. Roveglia. February 1st, 1926. (265,371.)

4,610. "Earth device for wireless and other electrical purposes." T. Nichols. February 17th, 1926. (265,389.)

5,178. "Crystal detectors for wireless apparatus." Partridges, Ltd., and H. Mills. February 23rd, 1926. (265,395.)

5,399. "Locking devices operated electrically from a distance." V. Booth. February 25th, 1926. (265,396.)

6,691. "Mercury-vapour apparatus." Hewittic Soc. Anon. March 14th, 1925. (249,121.)

7,512. "Electric signalling apparatus for indicating the positions of electric switches or the like." International General Electric Co., Inc. March 27th, 1925. (249,853.)

8,524. "Metallic-vapour tubes functioning as switches for alternating current." Siemens & Halske Akt. Ges. September 11th, 1925. (258,218.)

11,187. "Electrical tools." Chicago Pneumatic Tool Co. May 5th, 1925. (251,975.)

14,436. "Electric heating apparatus for liquids." K. F. Henneman and P. Kerkhoven. June 10th, 1925. (Addition to 235,513.) (253,525.)

15,028. "Electric power transmission systems." British Thomson-Houston Co., Ltd. June 18th, 1925. (253,910.)

18,856. "Loading coils." Siemens & Halske Akt. Ges. September 12th, 1925. (258,232.)

19,124. "Automatic control apparatus or relay actuated by fluid pressure." Creed & Co., Ltd., F. G. Creed, and A. Orling. November 5th, 1925. (Divided application on 256,285.) (265,071.)

19,187. "Electrodes for electric furnaces." Norske Aktieselskab for Elektrokemisk Industri. September 19th, 1925. (258,560.)

19,598. "Crystal detectors for wireless signalling." E. P. Murray. August 9th, 1926. (265,463.)

20,644. "Crystal wireless detector of the cartridge type." A. W. Griffin. August 21st, 1926. (265,469.)

20,921. "Wired radio broadcasting system." Wired Radio, Inc. August 25th, 1925. (257,611.)

21,673. "Sliding collectors for electric current." J. F. de Tovaros. September 2nd, 1926. (265,477.)

21,795. "Oscillation generators and the like." Telefunken Ges. für Drahtlose Telegraphie. September 11th, 1925. (258,257.)

21,956. "Loud-speaking telephones and loud-speakers." Friho Manufacturing Co., Ltd. (F. Holmann Akt.-Ges für Elektro-Technik-Medizin-Optik). September 6th, 1926. (265,478.)

21,992. "Hydrotherapeutic appliances." E. Havard. February 10th, 1926. (265,479.)

22,394. "Geared transmissions for the driving of dynamos effecting the lighting of trains." A. J. Makower and P. A. H. Mossay. September 18th, 1925. (258,579.)

22,512. "Electromagnetic sound reproducer." Brandes Laboratories, Inc. March 5th, 1926. (265,483.)

22,797. "Electrically-driven timepieces." M. A. Juillerat. September 15th, 1926. (265,485.)

23,812. "Electrical protective arrangements." Metropolitan-Vickers Electrical Co., Ltd. September 26th, 1925. (258,904.)

24,666. "Protecting device for electric detonators." H. L. Grant. October 19th, 1925. (259,945.)

24,693. "Telephone apparatus." H. Kuchenmeister. October 13th, 1925. (259,947.)

25,437. "Surface wiring for electric distributing systems." Liverpool Electric Cable Co., Ltd., and T. H. Tweedie. October 12th, 1926. (265,500.)

26,197. "Generation of electrical oscillations." Dr. A. Esau. November 10th, 1925. (261,350.)

27,225. "Sound-reproducing devices." Lee de Forest, Ltd. October 31st, 1925. (260,624.)

29,284. "Manufacture of filaments for electric incandescent lamps." General Electric Co., Ltd. July 10th, 1926. (265,113.)

32,020. "Portable electric lamps for miners." J. G. Dalos. March 9th, 1926. (Divided application on 259,902.) (265,522.)

32,541. "Vapour rectifiers." International General Electric Co., Inc. December 31st, 1925. (263,813.)

33,058. "Electrical time-lag devices." British Thomson-Houston Co., Ltd. (General Electric Co.). November 6th, 1925. (Divided application on 265,949.) (265,529.)

1927.

239. "Electric motor convertor sub-stations." T. W. Ross, C. Ryder, and Metropolitan-Vickers Electrical Co., Ltd. November 17th, 1925. (Divided application on 264,961.) (265,117.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from February 23rd:—

L.E.C. (lettering and design). No. 474,577. Class 13. Electric junction boxes and casing for surface wiring.—Liverpool Electric Cable Co., Ltd.

Bonfix. No. 475,614. Class 13. Electrical junction boxes and fittings therefor.—Sefton-Fiddian Leage & Co., Bush Lane House, Cannon Street, E.C.4

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ABRAM (Wigan).—Housing scheme (40), Bickershaw site, for the U.D.C.; surveyor.

AYRSHIRE.—New Town Hall at Largs, to cost £7,000; burgh surveyor.

BARNSLEY.—Two hotels, for the Barnsley Brewery Co., additional 163 houses, for the T.C.; borough engineer.

BASINGSTOKE.—Alterations, Mount Sanatorium; Hampshire C.C.

BATLEY.—Extensions to Technical College; Walter Hanstock and Son, Batley.

BEXLEY.—Additional housing scheme (260), for the U.D.C.; surveyor.

BLACKPOOL.—Central 'bus station near Talbot Road Station (to hold 500 'buses); borough engineer.

BO'NESS.—Joiners' and machine shops for Messrs. Thomson and Balfour, timber merchants; the manager.

BRISTOL.—Baptist Church (£10,000); for trustees, St. George's Baptist Church.

BURY ST. EDMUNDS.—Electric light installation, institution, for the B.G.; S. E. Day, borough electrical engineer.

CARLISLE.—Offices, Bank Street, for the Ocean Accident and Guarantee Corporation, Ltd.; H. E. Ayris, architect, 68, Lowther Street.

CHATHAM.—Extensions and electric lighting, Court House; Kent C.C.

CHERITON (Kent).—Kinema, for Bernard Miles, 113, Sandgate Road, Folkestone.

CHESTERFIELD.—Hotel (£15,000), Hollingwood, for the Chesterfield Brewery Co., Ltd.; Clayton & Rignall, architects.

CHESTER-LE-STREET.—Housing scheme (260); surveyor to U.D.C.

CLITHEROE.—Housing scheme (60); borough surveyor.

COVENTRY.—Extensions, Earlsdon Schools (£11,120), for the Borough E.C.; director of education.

COWLEY (Oxford).—Housing scheme (436), for Headington R.D.C.; W. Page Webb, architect, 23, High Street, New Headington, Oxford.

CROYDON.—Extension of postal sorting office, East Croydon; Office of Works. Billiard hall and shops, 89-99, High Street; Marcus Estates, Ltd. Showrooms and workshop, Leslie Park Road; Rees & Partners, 44, Park Lane.

DUKINFIELD.—Houses (44), for the T.C.; Marshall & Sons, builders, Ashton-under-Lyne.

DUNDEE.—Proposed conversion of Belmont Castle into Home of Rest (electric lighting); city engineer. New hotel, to cost £50,000 (electric light and radiators); secretary, Rock Villa Hotel, Ltd., Dundee.

EGHAM (Surrey).—Housing scheme (10), for Mrs. Willson, president of the Women's Engineering Society.

ERITH.—Tuberculosis dispensary; Kent C.C.

GLASGOW.—Warehouses, shops, and offices at Renfield Street and Drury Street, for Upsons, Ltd., 7, Great Dover Street, London; the manager. New offices and addition to workshop at St. Rollox West Mineral Depôt; Fleming Bros., 65, Bath Street.

HAILSHAM (Sussex).—Additional 72 houses, for the R.D.C.; surveyor.

HALESOWEN.—Grammar school extensions (£20,000), for the governors; the clerk.

HILLINGDON.—Secondary school for Middlesex Education Committee; Mr. W. S. Try, of Cowley.

HULL.—Re-erection of factory, Wincolmlee, for Chambers and Fargus, oil cake manufacturers (several thousand pounds).

IRISH FREE STATE (Dublin).—Motor omnibus garage at Summerhill, for the Dublin United Tramways Co.

(Dundalk, Co. Louth).—Additions to railway station for the Great Northern Railway of Ireland; Engineer's Office, Amiens Street, Dublin.

KIRKBY-IN-ASHFIELD.—Housing scheme (68), The Park, for the U.D.C.; L. Dodsley, architect, Public Offices.

KIRTLINGTON (Oxford).—Cement works, for the Oxford and Shipton Cement Co., Ltd.

LEAMINGTON.—Sewage scheme (£88,000); borough engineer.

LEEDS.—Erection of Trustees' Hall at Bardsey, near Leeds; Eric Vernon Wimpenny, architect, Wood Garth, Bardsey, near Leeds.

LONDON (West Ham, E.).—Extensions to Fyfield Schools (£14,850), for the Borough E.C.; education architect.

(E.C.).—New buildings, 7 & 8, King Street, and 25-26, Ironmonger Lane; Mr. W. Waterhouse. Rebuilding part of 78, Upper Thames Street; Gunton & Gunton. Buildings at 97-99, Cheapside, and 31-33, Lawrence Lane; G. E. Wallis & Sons, Ltd.

(Islington, N.).—Extension scheme, Royal Free Hospital, Essex Road (£200,000); governors.

(Wood Green, N.).—Proposed secondary school, Hampton Road; Middlesex Education Committee.

(St. John's Wood, N.W.).—Park Road improvement scheme (£52,000); Marylebone borough engineer.

(St. Pancras, N.W.).—Building in Hampstead Road; Messrs. Carreras.

(Lewisham, S.E.).—Nurses' home for Board of Guardians; Douglas Matthews, Son & Ridley, architects.

(Kensington, S.W.).—Rebuilding premises in Ball Street and Young Street; John Barker & Co., Ltd. Reconstruction scheme, North Terrace and Thurloe Mews; Mr. F. G. Selby, architect.

(Westminster, S.W.).—Shops in Rochester Row; Messrs. Robertsons, Ltd., 217, Knightsbridge. New building for Odhams Press, 12-16, Wilson Street, Long Acre; Francis Chambers & Son. Tenements, Willow Street; city engineer.

(Brentford, W.).—Transformer house, Great West Road; C. & S. Construction Co. Extensions, Reynard Mills, Windmill Road; Messrs. Charles Fox, Ltd. Store and distributing station, Great West Road; Cement Marketing Co., Ltd.

MAIDSTONE.—Houses (82), for the T.C.; R. Corben & Son, builders.

MEREDIN.—100 houses, Castle Bromwich and elsewhere; R.D.C. surveyor.

NUNEATON.—Additional housing scheme (70 or 80), for the T.C.; borough surveyor.

OAKHILL (Staffs.).—Billiard hall and assembly rooms, Trentham Road; Beckett & Bloore, architects.

SALFORD.—Proposed exhibition hall, kinemas, skating rink, underground motor garage, &c., Cross Lane district, for a London syndicate (£1,000,000); city engineer.

SANDWICH.—Extensions, Grammar School; Kent Education Committee.

SEACOMBE (Liverpool).—Re-erection of Gandy Belt Works, Wheatland Lane, electrically equipped, for Messrs. Gandy (many thousand pounds).

SEAHAM HARBOUR.—Café, bakery and dance hall, North Railway Street; Messrs. W. & T. R. Milburn, for Messrs. Snowden Bros.

SMETHWICK.—Additional 108 houses, Warley, for the T.C.; Roland Fletcher, borough engineer.

SOUTHEND-ON-SEA.—Town hall and offices, for the T.C.; Professor Adshead, architect.

SURBITON.—Extensions to Council offices, with lighting and heating (£5,450), for the U.D.C.; surveyor.

SUTTON-IN-ASHFIELD.—Housing scheme (100), for the U.D.C.; Warner & Bocock, architects, Mansfield Road.

TAVISTOCK.—Sanatorium, Kelly College (approximately £5,000); headmaster of college.

TEDDINGTON.—Municipal buildings, for the U.D.C.; surveyor.

THORNTON HEATH.—Improvements, Infirmary, Mayday Road; Croydon Board of Guardians.

TRURO.—Additions to Museum buildings for the Royal Institution of Cornwall; Cowell, Drewitt & Wheatley, Mansion House, architects.

TYNEMOUTH.—Extensions, printing works, Charlotte Street; J. W. Moore, Ltd.

WIGAN.—Additional 108 houses, Gidlow site, for the T.C.; R. B. Donald, borough engineer.

WIRRAL (Cheshire).—Nurses' home for Wirral Board of Guardians; Finchett, Lancaster & Archer, architects, 13, Hoghton Street, Southport.

WISBECH.—Theatre, for H. Bancroft.

WORCESTER.—Houses (118), for the T.C.; G. Smith, builder, Birmingham.

WREXHAM.—Houses (54), Acton Park, for the T.C.; Francis Roberts & Son, builders, Acrefair.